

AUTOMOTIVE INDUSTRIES

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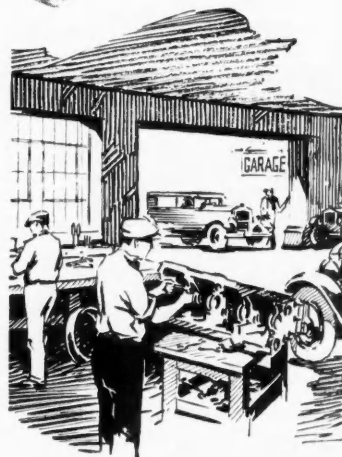
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AUTOMOTIVE INDUSTRIES

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Vol. 60

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Contents

Ford Changes Come Fast at Home and Abroad	395
Ford in Europe. By M. W. Bourdon	396
Smaller Caterpillar Tractor Requires Less Area for Maneuvering	403
Continental 7-Cylinder Aircraft Engine Develops 150 hp.	404
Just Among Ourselves	407
Compression Pressure Affects Thermal Efficiency, Detonation and Roughness	408
British Registration Figures Show Growing Popularity of Light Sixes	411
Team-work Will Run Durant Motors, Says Frederick J. Haynes. By Lewis C. Dibble	412
Factory Organization and Control Discussed by A.M.A. By K. W. Stillman	415
Redesigned Chassis Lubricating System Operates on Car's Kinetic Energy	416
New Compensating Piston Supported at Top by Ring and Invar Bar	418
New Developments	420
News of the Industry	422
Men of the Industry	424
Financial Notes	425
Calendar of Events	430
Advertisers' Index	100, 101

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C. A. MUSSELMAN, President and General Manager
J. S. HILDRETH, Vice-Pres. and Director of Sales
W. I. RALPH, Vice-Pres. G. C. BUZBY, Vice-Pres.
A. H. VAUX, Secretary and Treasurer
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JULIAN CHASE, Business Manager
Automotive Industries
Cable Address Autoland, Philadelphia
Telephone Sherwood 1424

OFFICES

New York—U. P. C. Bldg., 239 W. 39th St., Phone Pennsylvania 0080
Chicago—5 South Wabash Ave., Phone Central 7045
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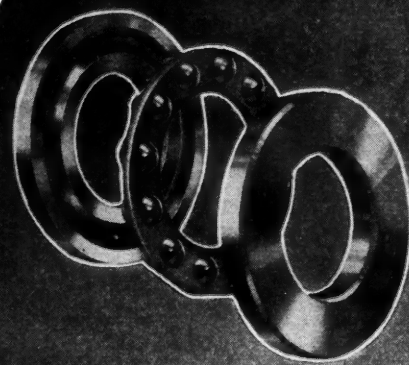
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AUTOMOTIVE INDUSTRIES

VOLUME 60

Philadelphia, Saturday, March 9, 1929

NUMBER 10

Ford Changes Come Fast At Home and Abroad

HENRY FORD and his activities have furnished more news for the financial columns in the last six months than at any time since the acquisition of all of the stock of the Ford Motor Co. by the Ford family in 1919.

For months prior to December, 1927, the industry and the public was asking, "What is Ford going to do to redesign his car and bring it up to date?" The announcement of the Model A answered that question. From that time on, Ford's production activities have been a center of interest.

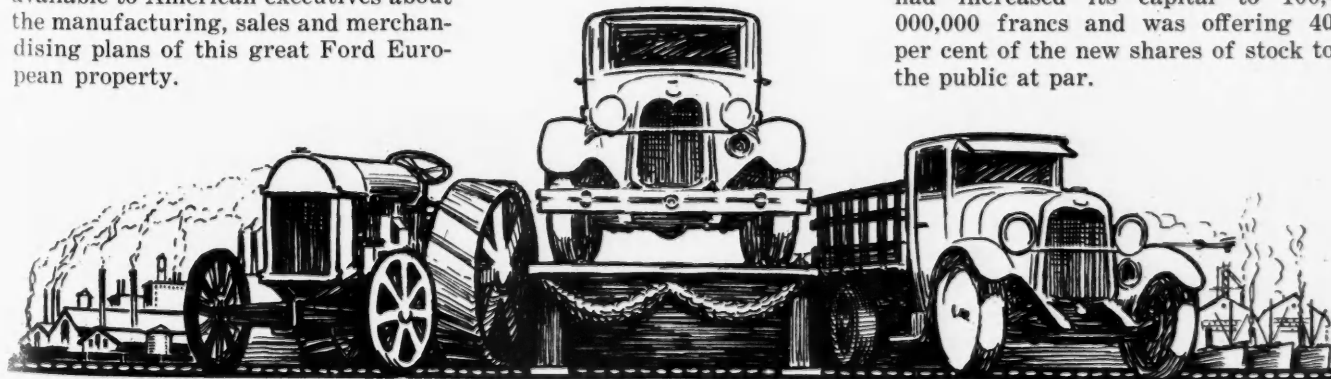
Since the Ford family obtained all of the stock of the Ford Motor Co., little detailed financial information concerning its progress and status has been available to outsiders, data of that kind being confined almost entirely to a statement made public each year by the State of Massachusetts to which Ford has had to report certain financial figures to do business in the state. With the stock of the Ford Motor Co. of Canada listed on the New York curb market, fiscal statements of that subsidiary have been available. This latter organization, according to its vice-president, W. R. Campbell, suffered a deficit of approximately \$4,000,000 on its operations in 1928 and probably will not pay a dividend in 1929.

The recent public sale of 2,800,000 of the 7,000,000 outstanding stock shares of the Ford Motor Co., Ltd., of England, served to focus financial attention strongly on Ford again and to arouse a vigorous interest in his plans for the establishment of subsidiary units. For this reason, as well as for the vast intrinsic importance of this newly reorganized British Ford subsidiary itself, the article which begins on the following page has a deep significance for every automotive executive. It contains the first detailed, authentic and specific information to be made available to American executives about the manufacturing, sales and merchandising plans of this great Ford European property.

The lack of any definite general knowledge as regards Ford's future plans is indicated by the conflicting character of the multitude of rumors which have been going about recently. Only a few days after a Detroit Ford official was quoted in *The New York Times* as saying he had no knowledge of any Ford proposal to build a factory in Russia, Henry Ford himself was quoted by *The Wall Street Journal* as stating that his revised plans for a large automobile plant in Russia are almost certain to meet with the approval of the Russian government. It has been alleged that his proposed Russian plant would be capable of producing 100,000 cars annually, that it would build tractors as well as cars, and that it would be operated by a subsidiary in which the Ford Motor Co. would hold only 40 per cent.

At the same time that rumors were persisting in financial circles that Ford had contemplated offering the public shares of the parent Ford Motor Co., others rumors were prevalent that he was trying to acquire complete control of the Ford Motor Co. of Canada. Both rumors have been denied.

Following the public offering of stock by the Ford Motor Co., Ltd., has come the announcement that the Ford Motor Co. A. G., the German organization which is a subsidiary of the Ford Motor Co., Ltd., is about to offer through the Deutsche Bank 2,000,000 marks of capital stock, the remaining 3,000,000 marks of stock to be held by the British company. The offering of this stock in the German company, it is understood, is to be confined solely to residents of Germany. The formation of a French company, similar in character to but a subsidiary of the Ford Motor Co., Ltd., is said to be about to be undertaken. Announcement was made in *The Wall Street Journal* and reported as confirmed in *The New York Times* recently that the Belgian Ford Motor Co. had increased its capital to 100,000,000 francs and was offering 40 per cent of the new shares of stock to the public at par.





Henry Ford

Ford

By M. W. Bourdon

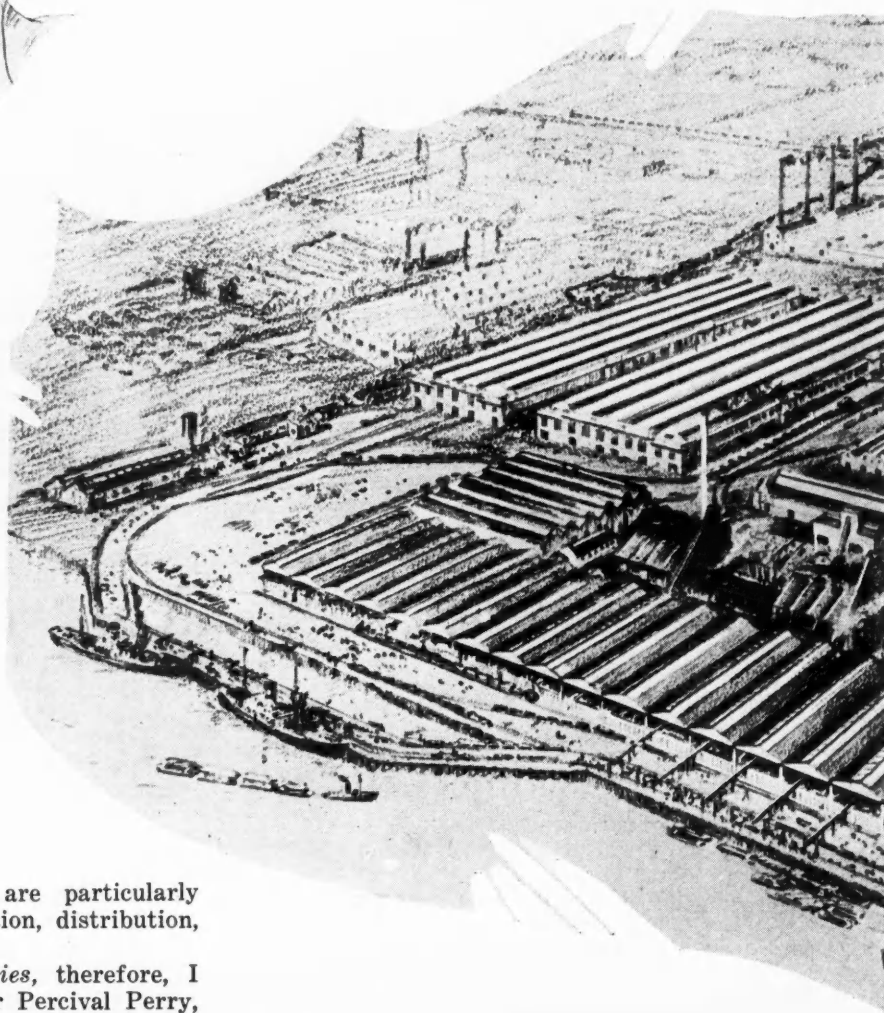
K.B.E., the chairman of the new company, with a view to obtaining for publication as much information on those points as is available and can be divulged at the present stage. Although exceptional circumstances prevented Sir Percival from making personal replies to my inquiries, it is through his courtesy and with his knowledge and authority that I am able to write the following.

It will be recalled that the prospectus stated that the new company would take over and operate assembly plants in nine European countries, the manufacturing and assembling plants at Trafford Park, near Manchester, England, and at Cork, Ireland, and take over the site for a large manufacturing plant to be built at Dagenham, near London. During the last few weeks

THE recent formation of the \$35,000,000 (£7,000,000) Ford Motor Company, Ltd., in England, to consolidate and extend Ford interests in Great Britain, Europe and parts of Asia and Africa, and the offer to the public of 2,800,000 ordinary shares of a par value of £1 each, represented an event of no small importance and of world-wide interest. The prospectus disclosed the strong position of the Ford organization in the countries in question, while the immediate response to the offer of shares—the issue being subscribed many times over—implies that the new undertaking is able to start upon its big scheme of development under very favorable conditions.

Although the prospectus contained all the information needed by the investing public, quite naturally it failed to refer to a number of points in which members of the automobile industry are particularly interested, such as plans for production, distribution, sales organization and prospects.

On behalf of *Automotive Industries*, therefore, I sought a personal interview with Sir Percival Perry,



In Europe

*America's Chief Exponent of Automobile Mass Production is
Expanding His Activities Rapidly Abroad*

arrangements have been made for an additional assembly plant to be built and equipped at Constantinople. Reports in circulation to the effect that an assembly plant would be established at Alexandria, Egypt, are incorrect.

The full list of assembling and manufacturing plants that will be operated are:

England, Manchester and Dageham; Ireland, Cork; France, Paris; Germany, Berlin; Belgium, Antwerp; Spain, Barcelona; Denmark, Copenhagen; Italy, Trieste; Sweden, Stock-

holm; Finland, Helsingfors; Holland, Rotterdam; Turkey, Constantinople.

From those plants, the company will exercise the sole and exclusive right it has acquired to manufacture,



Sir Percival Perry, K.B.E., Chairman, Ford Motor Company, Ltd., who is chairman of directors of the new \$35,000,000 British company promoted to acquire Ford interests in Great Britain and Europe generally

A view of the projected Ford plant at Dagenham, near London, England, on which work has already been begun. When completed, this plant will produce 200,000 cars and trucks annually for the European and adjacent markets



assemble, distribute and market Ford and Lincoln cars, Ford trucks and Fordson tractors in Great Britain and Ireland, on the Continent of Europe (except in Soviet Russia), in Egypt, certain other parts of Africa, Palestine, Syria, Arabia (except Aden), Iraq, Persia, and Afghanistan.

The headquarters of the company will be at Man-

OPERATION of assembly plants in nine European countries is to be conducted by the recently organized \$35,000,000 Ford Motor Co., Ltd., of England. British colonies and dependencies in Africa are not included in the territories reserved to the English company, however, but will be supplied by the Canadian company.

Headquarters of the English company will be at Manchester for the present. A building to house showrooms and executive offices is to be erected in the center of London on a site already obtained.

Preliminary work has been done on a tract at Dagenham, twelve miles from the heart of London, preparatory to constructing there the largest automobile factory outside the United States. It will involve a capital expenditure of approximately \$25,000,000 and will have a capacity of 200,000 cars and trucks a year.

There is no intention at the moment to manufacture Lincoln cars in England. For the time being, the organization of each Ford plant will requisition the American company for Lincoln supplies, but in the future that will be done with the knowledge and approval of the English executive.

chester for the present, but a site already has been obtained in the center of London for a new building, to contain showrooms and executive offices, from which the whole of its activities will be directed.

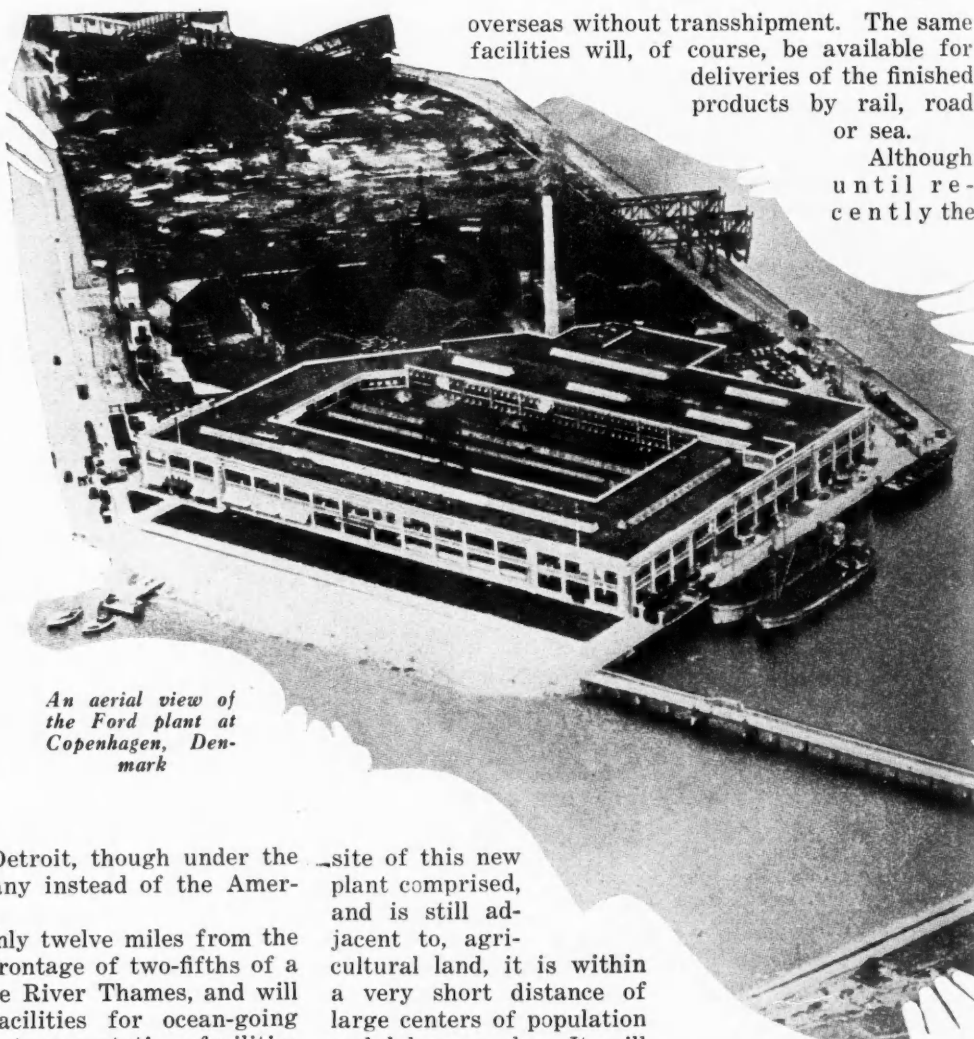
At this point, it will be well to deal specifically with the existing and future position and activities of the various plants.

Taking Dagenham first, on the almost dead-level 308-acre site there, preliminary work has prepared the way for the building of a manufacturing plant with a capacity of 200,000 cars and trucks per annum, which will make it the largest automobile factory outside the United States and involve a capital expenditure of approximately \$25,000,000. There, will be made all parts and body work required by the European assembly plants, which meanwhile will continue as hitherto to draw supplies from Detroit, though under the control of the English company instead of the American concern.

The site at Dagenham is only twelve miles from the center of London. It has a frontage of two-fifths of a mile on the north bank of the River Thames, and will have dock and wharfage facilities for ocean-going vessels. Equally convenient transportation facilities exist inland. The main line railroad between London and Tilbury docks bisects the site, and at the northern boundary is the new arterial road, also running from London to Tilbury and linking up with the new circular road that is to sweep around London and join up with the main highways leading from London to all parts of England. Raw materials, fuel, accessories and all other necessities will, therefore, be conveyed directly into the factory from any part of Great Britain or

overseas without transshipment. The same facilities will, of course, be available for deliveries of the finished products by rail, road or sea.

Although until recently the



An aerial view of the Ford plant at Copenhagen, Denmark

site of this new plant comprised, and is still adjacent to, agricultural land, it is within a very short distance of large centers of population and labor supply. It will be able to draw floating labor from London in general and the "dockland" of London, only five or six miles away. Nearer still, on the opposite side of the Thames, is Woolwich, where a large proportion of the population has been brought up in an engineering atmosphere, owing to that suburb of London having the Government Arsenal in its midst. The proximity of the site to large centers of population also will help to solve the early problems of housing and feeding the 15,000

employees who will eventually be required at the factory.

It is anticipated that the building of the plant and installation of equipment will be sufficiently completed in 1930 for production there to be begun in earnest, and thenceforth rapidly increased until the output is such that neither European nor British assembly plants will call upon Detroit for supplies.

Ford cars and trucks will be made at Dagenham. But there is no intention at the moment to manufacture Lincoln cars in England. For the present, the existing arrangements as to those cars are to be continued, whereby the sales organization of each plant will requisition the American company for Lincoln supplies, although in the future this will be done with the knowledge and approval of the English executive.

Even when the new plant at Dagenham gets into full production, the existing plant at Trafford Park, Manchester, will be retained and fully utilized. At present, its activities are mainly concerned with manufacturing and assembling Model A cars and trucks, and replacement parts for Model T and TTcars.

Like the Continental assembly plants, Manchester will in due course obtain components from Dagenham for car and truck assemblies, and will supply complete vehicles for the markets of Great Britain and Ireland. Replacements for Model T cars and trucks required for Great Britain, Europe and the company's reserved territories will be made at Manchester as long as there is a call for them. It is not improbable, too, that body work required for the chassis assembled at Manchester will be made there wholly, or partly as at present.

The Manchester plant has a capacity of approximately 40,000 cars and trucks per annum. At the present time, assemblies are being completed at the rate of 150 per day. Trafford Park, it may be said, is about five miles from the center of Manchester, which in turn is approximately 200 miles by road or rail from London and Dagenham. The plant is close to the Ship Canal, which leads from Manchester by way of the River Mersey to the open sea between England and Ireland. Thus, there will be excellent water transport facilities between this plant and Dagenham, as well as by rail and road.

The Ford plant at Cork, in the south of the Irish

Free State, originally was concerned mainly with the production of Fordson tractors. But its output hitherto has been small compared with what is planned for it in the future, since it will produce tractors for world-wide distribution. The Dearborn plant, in fact, already has been almost denuded of equipment, which has been shipped to and installed at Cork, where for several years, at least, the major part of the world's demand for the Fordson will be met. The enlarged and re-equipped plant would, it was hoped, be in full production by March 1 with a capacity of 30,000 tractors per annum.

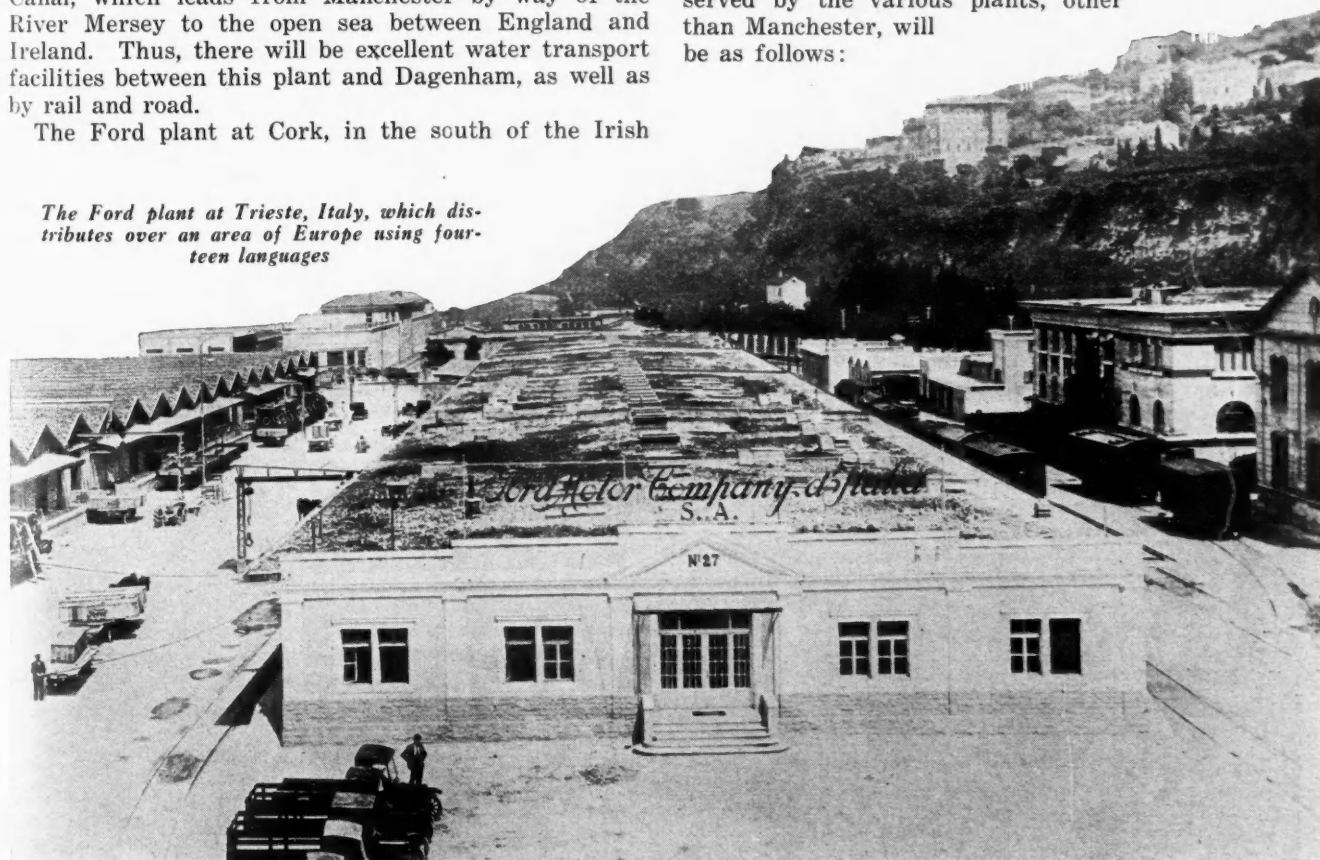
Passenger cars and trucks for sale in Northern Ireland and the Irish Free State will be distributed from Manchester, as at present, for, although this will mean that vehicles entering the Free State will be subject to import duty, the anticipated demand therein will not justify an assembly plant for cars and trucks in Ireland, especially as the 22-2/9 per cent preferential import duty would apply to components.

The established assembly plants on the continent of Europe can be divided into two categories; viz., major and minor. This classification has regard, not so much to the output, existing or potential, of the individual plants, as to the scope or extent of the assembly processes involved in completing each car or truck and making it ready for delivery to dealer or buyer.

On that basis, the Paris, Berlin, Antwerp, Copenhagen and Barcelona plants are in the major category, while the minor plants are those at Trieste, Stockholm, Helsingfors and Rotterdam. Whether or not any variation in the scope of the several plants in this respect will be made by the new company remains to be decided in the light of experience. For the time being, however, the arrangements made by Detroit will continue in force.

When the projected assembly plant at Constantinople comes into operation, the territories served by the various plants, other than Manchester, will be as follows:

The Ford plant at Trieste, Italy, which distributes over an area of Europe using fourteen languages



<i>Plant</i>	<i>Territories Covered</i>
Paris	France, French Possessions in Northern Africa, and Morocco.
Antwerp	Belgium, Luxembourg.
Berlin	Germany, Austria and Switzerland.
Stockholm	Sweden.
Barcelona	Spain and Portugal.
Helsingfors	Finland.
Copenhagen	Denmark, Norway, Poland, Roumania, Estonia and Latvia.
Rotterdam	Holland.
Trieste	Italy, Bulgaria, Hungary, Albania, Czecho-Slovakia and Jugo-Slavia.
Constantiople	Turkey, Greece, Palestine, Syria, Arabia, Iraq, Persia, Afghanistan, Egypt and certain other parts of Eastern Africa.

No British colonies or dependencies in Africa are among the territories reserved to the English Company. Ford products required therein will be supplied by the Canadian Company.

Each European assembly plant is to be viewed as a separate entity, without direct contact or organized co-operation with the others, and the only change from the arrangements hitherto in force is that, as from January 1 last, control is vested in the new British company instead of the American Ford Company.

There is no intention at present to have any of the European assembly plants begin manufacturing. The Manchester plant has been manufacturing to an ever-increasing extent for several years. All components and partly assembled cars and trucks will be supplied from Dagenham (from Detroit for awhile) ready for immediate assembly. Practically the same policy will apply generally to body work and accessories, although, in regard to those, constant study will be made of the possibilities of economizing by obtaining supplies through standard specification orders from contractors in the countries concerned, taking into consideration, of course, the customs duty on imported products. There will be no "stone-walling" of native firms if they can show that it will be to the advantage of the company, the individual plant or the Ford user to have certain items supplied by them. Tires are a notable case in point in France, Germany, Belgium and Italy.

A reference may be interpolated here to the small bore engine, which was primarily conceived for the British market in view of the basis of motor taxation in force in England. The engine, identical to its American counterpart in all respects apart from cylinder bore, is found to be in demand in preference to the larger one in countries other than Great Britain. A good proportion of passenger cars fitted with it are

being regularly supplied by nearly all the European assembly plants, even to territories where the larger bore would have no effect upon the tax payable by the owner. Another variation in demand that is catered to relates to the driving position. Most of the assembly plants are turning out chassis with either left-hand or right-hand drive equipment.

The managers and managerial staffs of the assembly plants will be natives of the countries concerned whenever and wherever possible, as hitherto. But it will be held essential that each manager, or his chief assistants, shall be versed thoroughly in the languages of all the territories covered by the individual plant. The importance of this point is made evident when it is stated, for example, that the Italian plant at Trieste is concerned with sales and distribution in countries employing fourteen languages, eleven of which are so different as to necessitate literature, posters and other publicity matter being printed in that number of languages. Native labor will be employed as largely as possible.

It has not been found that there are any substantial



All Ford tractor production activities have been Fordson tractors are being made for the world's is scheduled to reach the rate

differences in costs of assembly in the various countries where plants are in operation. Differences in the cost of completing vehicles for distribution are almost entirely due to variations in output and in import duties. Labor costs are practically the same in all assembly plants despite differences in wage rates, for it is found that the rates of wages applying in the various countries are more or less equalized by the different degrees of efficiency of the workmen. The wage rate at Manchester, for instance, is as high as, if not higher, than that in any other plant, and yet the efficiency of British labor compensates for the relatively high pay scale.

Relative to sales organization, each assembly plant will be complete in itself. It will remain, as hitherto,

The Ford Spanish plant at Barcelona, supplying Spain and Portugal



separate from headquarters and other plants in management, staff and publicity. Unless the individual manager can suggest a better plan, and show the headquarters' executive how and why it would be better in certain or all of the territories covered by his plant, however, the general sales policy recently adopted in England will be effective in all other countries. This policy represents something akin to a complete reversal of the Ford policy that was in vogue in England after 1919, which insisted upon appointed dealers handling Ford products exclusively. Under the new selling scheme, which came into force on January 1, certain classes of dealers may sell and stock other makes, as long as the latter are not directly competitive. Dealers are divided into four classes, termed respectively main dealers, sub-dealers, retail sub-dealers and limited dealers.

Each main dealer is given a reserved territory of fairly large area and under him work the sub-dealers and retail sub-dealers. The retail sub-dealer may be any bona fide and established motor trader in the main dealer's territory, although the main dealers and sub-

hundred vehicles, either to the public direct or to the dealers under him.

The fourth class—the limited dealer—is any bona fide motor trader in the main dealer's territory. He differs mainly from the retail sub-dealer in that he has no contractual obligations and merely signs a price maintenance agreement. In regard to discount, the limited dealer class is sub-divided. The man who qualifies to give Ford service obtains double the discount (ten per cent) allowed to the garage or service station proprietor who is unable to do so. The penalty for price-cutting in all cases is a fine of £100, or its equivalent and the sacrificing of the discount earned by the sale.

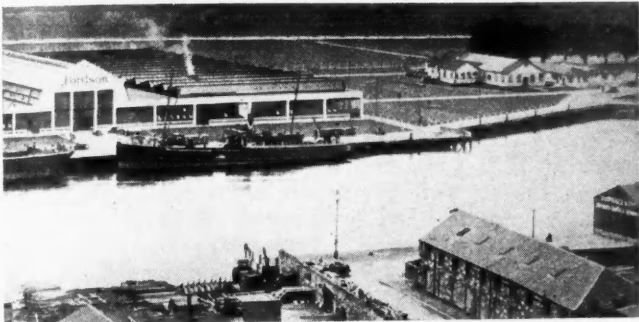
Purchasers of fleets of Ford vehicles for their own use are granted a discount on a sliding scale according to the number of vehicles bought within the year, the maximum discount applying to a fleet of one hundred.

This trading policy will apply in due course, as stated, in the territories covered by all assembly plants unless some good and sufficient reason for modifying it is advanced to headquarters.

As regards time sales, eventually these may all be financed by the Ford Credit Co., Ltd., a British subsidiary located at present in Manchester. As far as possible, the same terms will apply in all territories reserved for the new company. In respect to cars and trucks, these terms, in brief, are: Down payment of at least 25 per cent, with payment of the balance, plus charges, in monthly instalments within twelve months, the buyer contracting for insurance at his own risk and expense. The minimum charges are allowed for a down payment of 50 per cent and the balance within six months. Time payment terms for tractors are similar, varying mainly in that quarterly payments of the balance are accepted, while insurance is optional.

There are several points concerned with sales and distribution about which precise information is lacking at present. Thus the question as to whether any special precautions or reservations will have to be made relative to time payments in certain of the countries covered, or to be covered, by the assembly plants cannot be decided until further development takes place. At present, there is no reason for believing that cash transactions will have to be insisted upon generally in any country, or parts of a country, owing to the unsatisfactory nature or lack of legal protection, dilatoriness of legal process in civil courts, difficulty in securing repossession when and where necessary, general financial instability of population and so on.

No general statement can be made as to the sales outlook in the more or less undeveloped countries



transferred from Detroit to Cork, Ireland, where markets, including the United States. The output of 30,000 per annum this year

dealers have been chosen almost entirely from the organization existing prior to the beginning of this year. Each of these first three classes contracts to take a given number of vehicles in the year, and the discount earned immediately on individual sales is supplemented by rebates awarded on a sliding scale according to the number of vehicles taken. Thus every vehicle sold in a main dealer's territory assists him in earning his rebate, although there is nothing to prevent a sub-dealer from earning an equivalent rebate if he sells the requisite number of cars. The maximum rebate is gained by the dealer who can dispose of five

The Ford plant at Hoboken, Antwerp, Belgium, facing the River Scheldt



reserved to the new company. Reports on this subject are held to be of a confidential character. To a certain extent, the same remarks apply to experience and anticipations relating to the competitive situation. The latter differs considerably in the various territories. As might be expected, competition from the Ford standpoint is keenest in France, Italy and Germany, where purely native products have considerable advantage in view of the heavy duties on imported motor vehicles and components. Particularly does that apply to France, where the duty payable works out at 49.7 per cent *advalorem*. Elsewhere, the Ford is at least on equality with the products of other manufacturers, European and American, and stands to advantage in a very big market on the basis of performance, service, price and established reputation.

Sales and Distribution Costs

The ratio of sales and distribution costs naturally varies in the different countries, but not to any great extent, and there is no reason to anticipate anything exceptional in this respect in those countries which, comparatively speaking, are more or less undeveloped both as regards motor transport generally and the Ford sales organization in particular.

Nor is any exceptional or unexpected sales resistance being experienced in any area owing to the characteristics—such as conservatism, thrift, lack of intelligence or education, habits or what-not of the general population. Naturally, for the time being, sales are effected mainly in the cities, towns and surrounding areas in several countries of the Near and Middle East. But the scope of motor transport is rapidly broadening everywhere to-morrow, a sudden and immense increase to the benefits to be gained from the use of motor vehicles and to the still greater benefits they will afford in conjunction with good roads. The scarcity of the latter is undoubtedly the chief sales resistance in some areas at present, but their building and maintenance are not an essential preliminary to the further increase of sales in the countries concerned. Given good roads everywhere to-morrow, a sudden and immense increase in demand would, of course, be experienced. But road development must not be expected to precede the use of motor transport. Rather will the latter lead toward and encourage the former.

For a while, if not indefinitely, in some areas the demand for trucks may equal, if not exceed, that for private passenger cars. The Ford 1½-ton truck chassis

is of a type particularly suited to the development of town and rural bus services in a number of territories.

As regards service and replacement supplies, these are already well provided for in a large proportion of the area reserved to the new company. The user in undeveloped areas cannot be given and does not expect the same facilities that are available to the Ford user in highly developed and thickly populated countries. But there will be no lack of consideration of his interest, and each assembly plant will arrange with its dealers, as in the past, to insure that efficient service shall at least keep pace with sales and foster the latter.

It is peculiarly appropriate that Sir Percival Perry should be the chairman of the new European Ford organization, for he it was who introduced the first Ford car into Great Britain.

Bristol, in the west of England, is his native city, although Birmingham claims credit for his rearing and education. As a young man, he was first connected with the cycle industry. Subsequently, he spent some time in America and then returned to England to enter the motor trade in London. There, he secured the Ford agency in 1907 and sold the first Ford car in England. In 1910, he was given the sole representation of Ford products in Great Britain, and in 1911 organized and was put in charge of the assembly plant which in that year was established at Manchester.

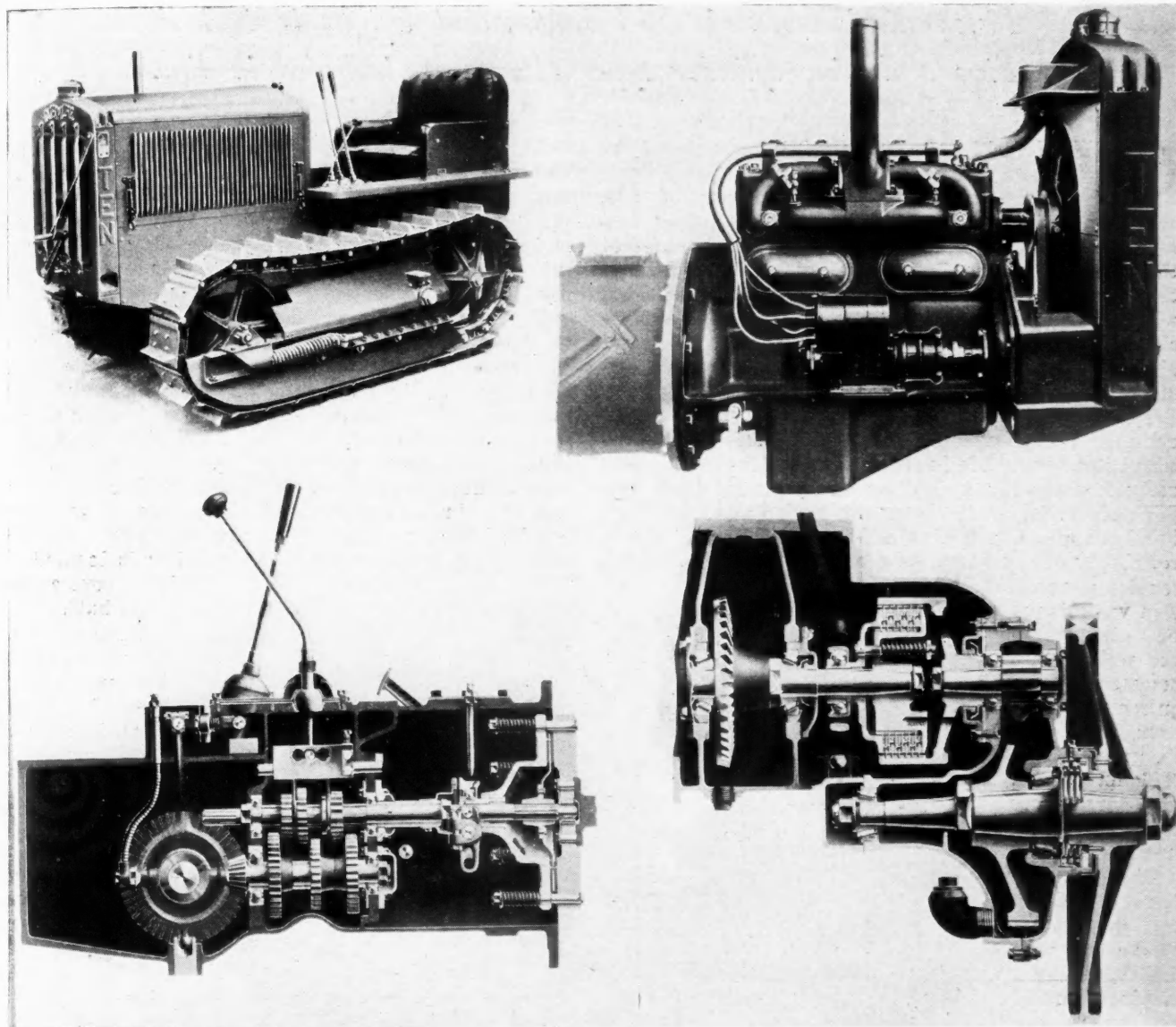
Sir Percival Perry's Career

From 1910 to 1914, Sir Percival, then Mr. Perry, increased the sales of Ford cars in England from 565 to 8352 per annum, and during the war continuously increased the output of the Manchester plant, mainly for war purposes. His other activities during the war included service with the Ministry of Munitions as Director of the Agricultural Machinery Department. For this and other national work in connection with mechanical traction he received a knighthood in 1918.

After the war, Sir Percival retired to the island of Herm, one of the islands in the English Channel adjacent to the north coast of France, which he had bought outright. Up to the beginning of last year, there was no intention on his part to reenter the automobile industry. But at about that time Henry Ford, then on a visit to Europe, saw him, and, as a result of their conversation, an urgent cablegram called Sir Percival to the United States a few months later to discuss plans for putting into being the organization of which he is now the head.



Smaller Caterpillar Tractor Requires Less Area for Maneuvering



Herewith is a view of the new Caterpillar Ten tractor, its engine with the relatively large sized radiator, a section of the clutch, transmission and driveshaft and a vertical section through the driving gears

THE new model tractor which was reported several months ago to be in process of development by the Caterpillar Tractor Co. of San Leandro, Cal., and Peoria, Ill., is now in production, and deliveries on it have just been begun. It is known as the Caterpillar Ten tractor and has a rating of 10 hp. on the drawbar and 14 hp. on the belt. Its weight is between 4000 and 4500 lb. and the price is \$1,125 f.o.b. Peoria, Ill., which compares with \$1,675 for the "two-ton," which latter has a drawbar rating of 15 hp. and weighs 5500 lb.

One advantage of the new model is its ability to operate in restricted spaces, where the larger tractor

cannot be maneuvered so well. The four-cylinder engine has a bore of $3\frac{3}{8}$ in. and a stroke of 4 in. and gives its rated power at the governed speed of 1500 r.p.m. Crankshaft bearings are $2\frac{1}{8}$ in. in diameter and camshaft bearings $1\frac{7}{8}$ in. The pistons are $4\frac{1}{4}$ in. long.

Gasoline is used as fuel and a supply of $17\frac{1}{2}$ gal. can be carried in the tank. The Ricardo type of cylinder head is used and the cylinders and upper section of the crankcase are in one casting. The camshaft is drilled through the center and forms the main oil lead for pressure lubrication to the crankshaft and camshaft bearings.

Continental 7-Cylinder Aircraft Engine Develops 150 hp.

Piston displacement is 543 cu. in. and weight is 400 lb.

Five and nine cylinder types also to be included in line.

CONTINENTAL MOTORS CORP. has entered the aircraft engine field with a series of three types of radial air-cooled aircraft engines of five, seven and nine cylinders, respectively. Robert Insley, a well-known aircraft engine expert, is chief of this division of the Continental plant. The first of the new types to be completed is the seven cylinder, which was exhibited at the New York automobile show. Production of the new engine will be begun about April first, as soon as the Department of Commerce and other tests have been completed.

The engine is a fairly conventional air-cooled seven-cylinder radial of split-crankshaft design. No attempt has been made in its design to achieve an unusually low specific weight or exceptionally high output per cu. in. of displacement, major attention having been given to a high safety factor for all parts, reliability of operation, ease of manufacture and reasonably low cost. The weight and output figures are well within commercial requirements, however, being 2.66 lb. per hp., and .276 hp. per cu. in. (horsepower figures according to rating.)

The cylinders have a bore of 4 $\frac{1}{2}$ in. and a stroke of that length, giving a displacement of 77.7 cu. in. per cylinder, and 543 cu. in. for all seven. The compression ratio is 5 to 1. At 1850 r.p.m., the engine develops 150 hp. The engine, with carburetor and magnetos but without starter, generator, exhaust pipes and air intake heater, weighs 400 lb.

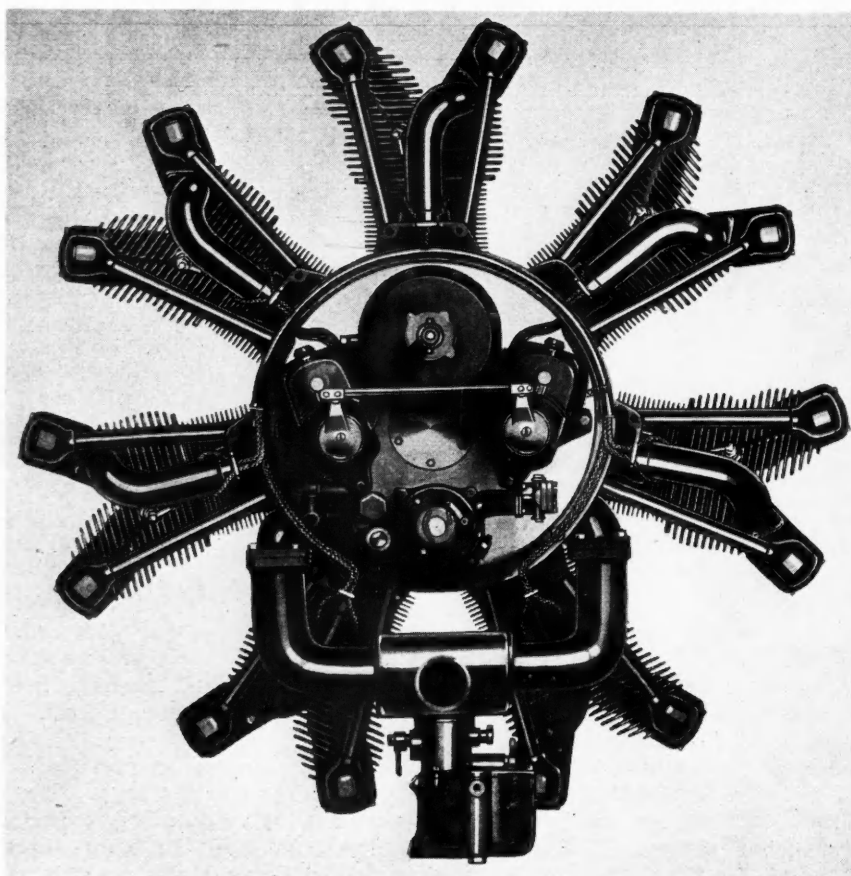
Cylinder bar-

rels are forged steel with aluminum alloy heads, heat-treated, shrunk and screwed on. Valve rocker boxes are cast integral with the cylinder heads and are provided with cast aluminum covers, secured by studs and nuts. Aluminum bronze valve seats are shrunk into the head, spark plug inserts being of the same material.

Each cylinder is secured by 10 studs and nuts to the cast, heat-treated aluminum alloy crankcase. The latter is split in the center plane of the cylinders, the front half carrying the ball thrust and main forward roller bearing. The rear half contains the rear main roller bearing, the cast-in induction manifold, cam follower guides, and mounting bosses. The main roller bearings are mounted in bronze liners, and the thrust bearing (which is located well forward of the front main bearing for crankshaft rigidity) in a steel retainer. A breather is located on the front crankcase half.

Pistons are of the long-skirt type and of heat-treated aluminum, being cast in permanent molds. Piston heads are made fairly thick, to keep down the piston temperature and permit of small clearance without scuffing. Expansion reliefs are provided near the pin bosses. Piston pins are secured in the pistons by wire snap rings. There are four rings to the piston, three above and one below the pin.

Master and articulated rods are all of H section and of chrome vanadium steel, the master rod be-



This is a rear view of the new Continental seven-cylinder airplane engine being manufactured by the Continental Motors Corp., of Detroit, Mich.

ing of the one-piece type. All rods are completely machined. Link-pin as well as piston-pin bushings are of bronze, while the crankpin bearing is a steel-backed, babbitt-lined cylinder. Link pins are case-hardened and secured by locking plates.

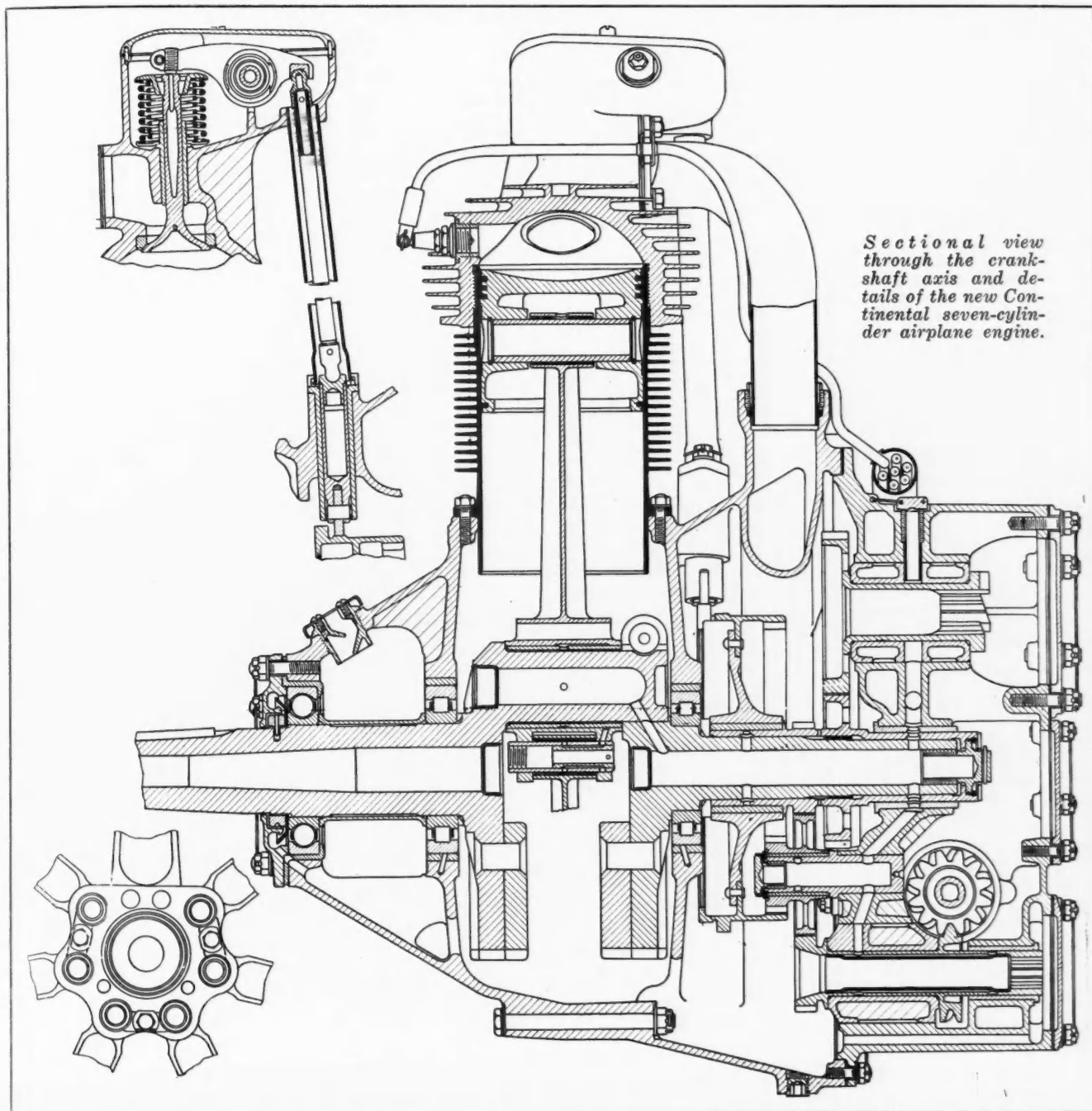
The crankshaft is of the two-piece type, assembled at the rear crankcheek. It is of chrome-nickel steel. The two halves are secured by means of a clamping bolt. The shaft is drilled for lightness, and plugged to provide pressure lubrication to crank and link-pin bearings. Pressure lubrication is also supplied to accessory drive bearings, with splash to other parts. All oil leads are drilled, there being no internal oil piping.

Timing and starter gears are driven by a spline at the center of the rear portion of the crankshaft. The cam ring assembly is mounted on a bronze bearing and driven by an intermediate gear mounted on a stud shaft secured in the gearcase. The crankshaft starter gear mounted on the spline referred to meshes with the starter gear above the crankshaft in a one-to-one

ratio. The same crankshaft gear also meshes with the two magneto drive shaft gears, integral with these shafts. Cam and generator and pump shafts are driven by the crankshaft timing gear through a serrated clutch held in engagement by a screw at the end of the crankshaft. Of these shafts, the generator shaft is driven indirectly through the cam intermediate gear. The pump shaft is located transversely at the rear of the gearcase and is driven indirectly through helical gears on the generator shaft. From the pump shaft, which drives both a pressure pump and a scavenging pump, the tachometer and fuel pump drives are taken, one at each end.

All accessory drive gears are forged integral with their shafts, and plain, split-type bearings are used, except in the case of the oil pump shaft, which is mounted on ball bearings. All these gears, except, of course, the helical pump gears, are of the straight spur stub-tooth type, and of chrome-vanadium steel.

The serrated clutch mentioned above is for timing adjustment, which is easily accomplished by disengag-



ing the clutch by loosening the screw at the rear end of the crankshaft.

Returning to the valve gear, cam follower guides are of a special aluminum alloy bearing metal. The cam ring and gear are of chrome-vanadium steel, case-hardened, and are riveted to a forged duralumin hub. Rollers are also case hardened, as are roller pins and push rod cups. Push rods are of duralumin tubing mounted with hardened steel ball ends. Rocker arms are mounted on ball bearings, with tappet clearance adjustment on the front end of the rocker arm. Valves are of the hollow stem tulip type, both inlet and exhaust being made of CNS steel. Two straight helical springs are used on each valve.

Two Scintilla magnetos are fitted, the standard S.A.E. three-bolt flange mounting being used. Distributor units for battery ignition can be substituted. Spark plugs are B.G., two per cylinder. Radio shield-

Major Specifications of the Continental 7-Cylinder Aircraft Engine

No. of cylinders	7
Bore and stroke	4 $\frac{5}{8}$ by 4 $\frac{5}{8}$
Displacement	544 cu. in.
Rated power	150 hp. at 1850 r.p.m.
Weight (approx.)	400 lb.
Fuel consumption	.52 per b.hp. per hr.
Oil consumption	.03 lb. per b.hp. per hr.
Diameter mounting bolt circle	20 in.
Outside diameter	41 $\frac{3}{4}$ in.
Propeller mounting	S.A.E.No. 2 taper
Propeller mounting, optional	S.A.E. No. 20 spline

ing can be furnished. Any type of starter now available, it is stated, can be mounted, since the starter shaft carries both a three-jaw clutch and an internal starter spline. Cylinder heads are tapped to accommodate the Heywood starter fittings.

An S.A.E. flange is provided for a fuel pump mounting, to be driven through a coupling from the pump cross shaft. The carburetor is a single-barrel Stromberg. Mixture is carried to the cast-in, "horse-shoe" manifold by a double, U-shaped intake pipe. At the juncture of the arms of this pipe, an automobile-type hot spot jacket is provided.

Heat control is designed to be operated from the cockpit by means of a butterfly valve, as in automobile practice.

Exhaust flanges on the cylinders face forward. An exhaust ring and nose cowling will be furnished if desired, it is stated.

Variable Area Wing Developed for Airplane



Plane with Fowler variable area wing

THE requirements in airplanes with respect to wing area are more or less conflicting. Large wing area is required to get off the ground easily and also to make low landing speeds possible, while, on the other hand, a comparatively small wing area adds to the maximum speed and the cruising speed. To make safe takeoffs and landings possible and at the same time obtain the superior performance inherent in small wing areas and consequent high wing loadings, Harlan D. Fowler of New Brunswick, N. J., has developed a variable area wing which he installed on a PA-3 plane.

As shown by the photograph, the construction comprises an auxiliary wing centrally behind the main wing and forming an extension thereof. For taking

off and landing the auxiliary wing occupies the position in which it is shown in the photograph, while in normal flight it is withdrawn under the main wing. The construction is said to be simple and the auxiliary wing completely controllable throughout the range of change in area.

Mr. Fowler has made comparative test flights with the original PA-3 biplane and with the Fowler wing installed, the same OXX-6 engine being used in all cases, and the results of the tests are given in the following table:

Comparative Performance Of Original PA-3 and Fowler Wing

	Fowler Variable Area		Original
	Extended	Normal	PA-3
Total load, lb.	1990	1990	1936
Wing area, sq. ft.	166	136	338
Climb from rest to 1000 ft.	3'55"	3'33" (1)	2'3"
Climb ft. per minute at 1000 ft.	250	415	520
High speed m.p.h.	78.75	98.75	89.3
Cruising speed m.p.h.	69.25	79.85	76.6
Low speed m.p.h.	44.55	58.25	46.2
Stick, seconds	11	10	10
Unstick, seconds	11	9	9
Speed range	1.77	2.22	1.93
Weight per hp. at 100 hp.	19.90	19.90	19.36
Weight per sq. ft.	12.00	14.65	5.72
Design load factor of wing	8.00	8.00	5.50
Weight of wings, complete, lb.	395	395	377

(1) Wing extended to 500 ft., normal 500 ft. and up.

Just Among Ourselves

Question List Aids Meeting Discussions

AMERICAN MANAGEMENT ASSOCIATION, it seems, has a practice of preparing, in connection with each paper to be read at its meetings, a list of some twenty questions pertinent to the topic under consideration. These questions serve, not only as a guide to the author in the preparation of his paper, but also as the basis for starting and insuring relevant and useful discussion at the meeting itself. Would seem to mean a good bit of work for those organizing the sessions, but the idea appeals to us as well worth the effort.

* * *

Positive Ideas on Service Work

SOME people have pretty positive ideas. We ran into a couple of them the other day; men who have been associated with things automotive for a long while back. Got talking to them along the lines of car dealer service and maintenance work. Before we got through they expressed some rather positive opinions; we don't have to agree with all of them to consider them interesting enough to pass along. Here's about the way they ran:

* * *

"Service Front" and Owner Convenience

WE believe that the successful car dealer of tomorrow will service all makes of car; that he will be set up to perform quickly and profitably that multitude of small services such as oiling, greasing, brake repair, washing, etc., which every car owner has to have regularly and conveniently; that he will actively mer-

chandise accessories. We believe that the important thing to a car dealer is not how beautiful his showroom is, but how much net profit he has made at the end of the year. He will service all makes of cars because when he refuses to work on cars other than that which he sells he is driving prospects away from his place of business instead of getting them into it and exposing them to his proposition. He will service all makes of cars because he will thus be enabled to have his service station working at full load a far larger proportion of the time than when he sticks to his own line exclusively; full load operation increases profit in a properly operated service station. Ask any independent repairman. He will set up his facilities to provide routine, day-to-day services for all car owners in his neighborhood as well as for the owners of his particular make, because there is profit to be made from these services and he needs to make that profit. He will get more thrill out of an increased net and a "service front" on his establishment than he will out of a vast expanse of plate glass. He will do these things because they are profitable and sound in themselves and because his factory in the end will be urging them on him as the best route to stability and financial soundness. An interesting slant, don't you think? Would be glad to get comments from any of our readers.

* * *

Engineering Education and Machine Tools

THIS was considered hot stuff in 19—." A former president of the Society of Automotive Engineers sug-

gested to us the other day that a sign bearing some such legend ought to be hung on every machine or tool in the college and university laboratories and shops where young men are being trained in mechanical engineering subjects. He had just returned from a visit to his alma mater and was imbued with some very vigorous ideas about engineering education as it is now conducted. The obsolete character of much of the machine equipment used for instruction purposes was one thing that was on his mind very definitely.

* * *

Industry Based on Constant Change

THE colleges tend to impress the student with the idea that there are certain fixed rules and principles to go by and that these rules are unvariable. Thus the student tends to get an entirely erroneous idea of the conditions he is going to meet when he gets out into industry. "The outstanding thing about the automotive engineering and production field today," he went on, "is that nothing stays put for long. Manufacturing practice of five years ago in many respects is quite obsolete today. When you train a boy to believe in the absolute fixity of rules and at the same time train him in contact with equipment already obsolete, you can see what you're coming to. The least the university could do would be to hang a sign on every piece of equipment saying 'This was considered hot stuff in 1918,' so that the student would have impressed on his mind the fact that changes have been and still are taking place constantly."

—N.G.S.

Engine Compression Pressure Detonation and Roughness

*Effectiveness of combustion depends upon uniformity of mixture and rapidity of flame travel. The latter factor is antagonistic to smoothness of operation.**

COMBUSTION chamber design practically has standardized the medium offset type of head with domed contour, but the results obtained with this type of chamber fall short of the possibilities. A ratio of 5 to 1 or 5.25 to 1 is about the maximum limit for comfort with an L-head engine having a combustion chamber of the type mentioned. While it is possible to obviate detonation at ratios around 6 to 1 by the use of anti-knock fuels, the consequent exaggeration of the roughness tendency precludes general use of this ratio. If the improvement in engine efficiency that is still possible through the use of higher compressions is to be realized, it is necessary to deal on a rational basis with the barriers which the combustion process offers to increase of compression.

There are three distinct aspects of the combustion process which will be dealt with: namely, (1) thermodynamic efficiency; (2) tendency to detonation, and (3) shock tendency. While the two characteristics last mentioned are entirely independent of each other, they are both influenced by the combustion efficiency.

The most important factors in promoting efficient combustion are a high degree of turbulence, low proportion of inert diluent, high density and temperature at ignition, and proper spark plug location with respect to the flow of the incoming charge.

Turbulence is the result of agitation, which is so essential to the production of a uniform mixture; it is primarily dependent upon intake velocity and not on combustion chamber design. ** The presence of inert gases in the combustible mixture decreases the probability of obtaining uniformity throughout the mixture. If the latter condition obtains, the combustion efficiency is little affected by the form of the combustion chamber and by the location of the spark plugs, except in so far

as the form of the chamber affects the pressure-time characteristic. As regards the latter, the slower the combustion, the lower will be the combustion efficiency, as a rule. On the other hand, from the standpoint of smoothness of operation, it is desirable to prolong the time of combustion as much as possible, and this will be discussed in more detail later. Aside from this, however, if the conditions of operation produce a non-homogeneous mixture, the direction of flow of the incoming charge with respect to the plug, which depends on the

shape of the chamber and the location of the plug, may make the difference between efficient and inefficient combustion.

Thus with small throttle openings, when the proportion of spent gas in the mixture is high, and at high speed, when the exhaust back-pressure is high and the time available for combustion is short, chamber design becomes the limiting factor. Under these conditions, any delay in the initiation of combustion is fatal to efficiency, and if the mixture surrounding the spark plug is close to the limit of combustibility, so that the combustion has a slow start, the exhaust valve

may open when it is only half completed. This produces the so-called "high-speed miss," which occurs with many engines. While it has been shown that this "miss" is sensitive to changes in ignition characteristics and often can be eliminated by the use of coils giving a more powerful spark, or by the use of magneto ignition or spark boosting, this is no proof that the ignition system is at fault, but rather indicates the existence of a poor fuel mixture in the neighborhood of the spark plug points.

Another corrective for "high-speed miss" often used is excessive spark retard, which results in a higher exhaust temperature, a higher mixture temperature in a hot-spotted manifold, and a greater heating effect from the residual exhaust gas, all improving the mixture con-

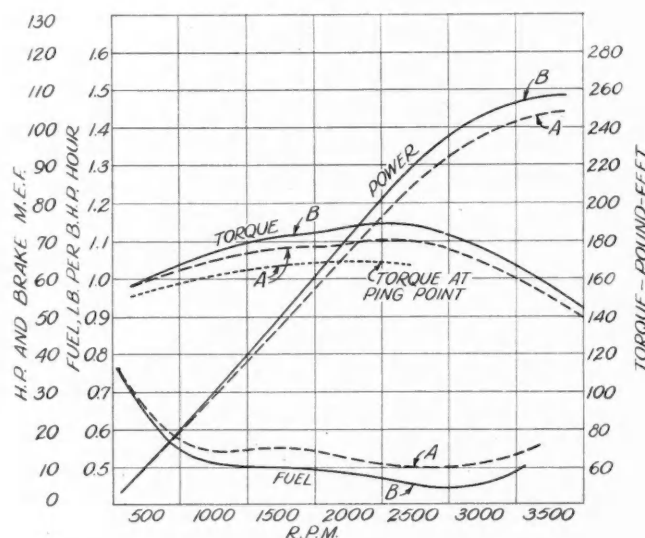


Fig. 1—Effects of improvement in combustion chamber design on horsepower, torque and fuel consumption

* Condensed from a paper delivered before the Detroit Section, S.A.E., Feb. 11, 1929, by R. N. Janeway.
** See Automotive Industries Nov. 10, 1928, page 644.

Affects Thermal Efficiency,

dition, giving a higher compression temperature and aiding combustion.

The use of excessive spark retard and magneto ignition are not necessary, however, for the elimination of "high-speed miss." It has been found possible to completely eliminate this trouble by correct combustion chamber design alone. Primarily the plug should be as nearly as possible in the direct path of flow from the annular passage between the intake valve and its seat. If the plug is too close to the intake valve, or too far above it, it must depend on the fresh charge with flows over the top of the valve with relatively low velocity.

The controllable factors which affect combustion efficiency are the following:

1. Fuel distribution.
2. Pressure-time characteristic of combustion.
3. Spark plug location with respect to intake flow.

The second phase to be considered, detonating tendency, was discussed by Mr. R. N. Janeway in two recent articles in *Automotive Industries*, in which it was shown that this may be controlled by regulating the temperature of that part of the charge which burns last, through a chamber design having a high surface-volume ratio for this part of the charge. It might be added

that the metal resistance to heat transfer is relatively small, so that wall thickness becomes a minor factor, although aluminum heads help to reduce detonation. However, the resistance of the water film is extremely important, and water circulation therefore should be rapid and unrestricted, especially on the wall surfaces immediately above

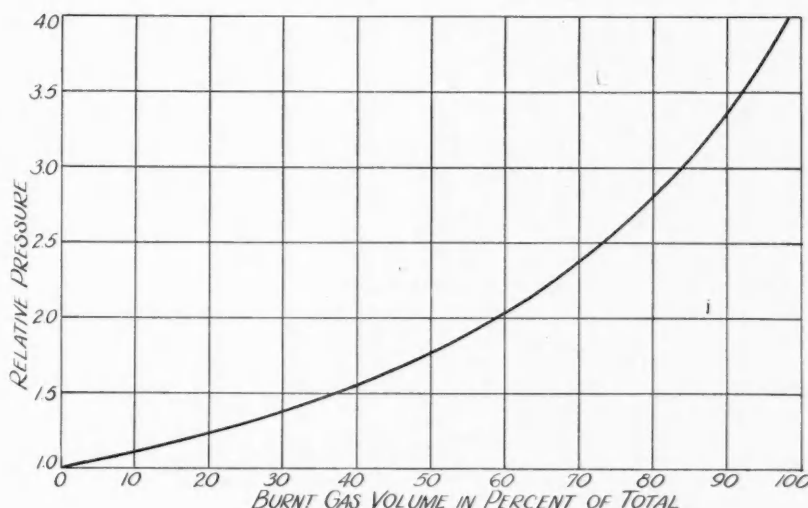


Fig. 3 (above)—Relation between pressure and volume of burnt gas

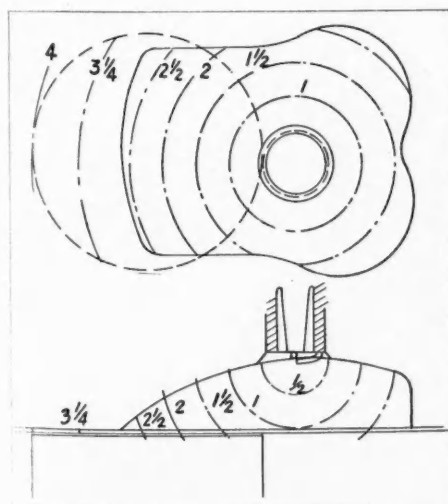


Fig. 4—Showing shape of combustion chamber and indicating progression of flame front

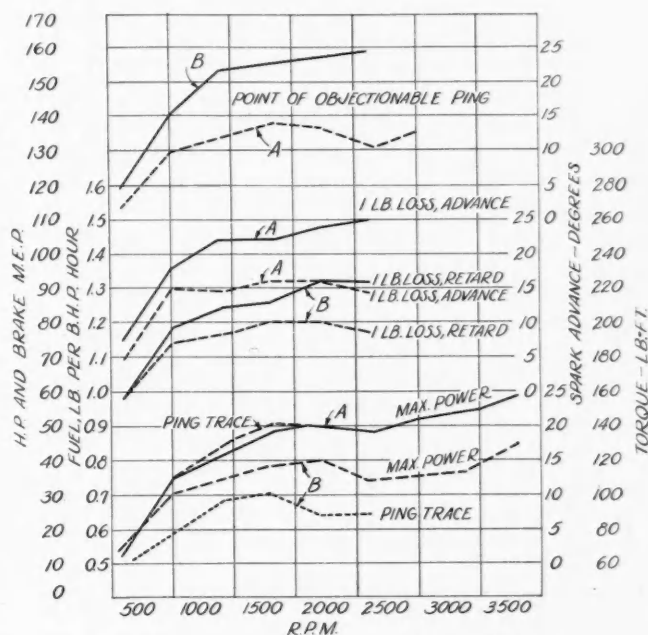


Fig. 2 (above)—Spark advance for power curves

and adjacent to the combustion chamber clearance space (offset type).

The piston head temperature also is important, and the aluminum piston permits of the use of a higher compression than the iron piston. In the writer's opinion, however, this advantage of the aluminum piston is not always fully realized, owing to the use of too thin

a piston head for the sake of weight reduction. The lowering in temperature made possible by judicious addition of metal to the piston head is well worth the small increase in weight involved.

The exhaust valve head normally represents the hottest surface in the chamber and therefore can increase detonation. By locating the plug in the vicinity of the exhaust valve, the gas surrounding it is caused to burn first, and it can then do no damage. Of course, firing from the center of a chamber of the offset type produces the same effect, but when firing from the inlet valve, passage of the unburnt gas over the hot exhaust valve may raise the temperature of that portion of the charge which burns last.

The extent to which proper application of heat flow principles permits of the use of higher compression

ratios is shown in Figs. 1 and 2. Head A is a typical offset-type, of domed contour, fired from about the center of volume, and represents the best conventional L-head design. The compression ratio was 5.4 to 1. Head B is a special design, embodying the features outlined, and of 5.8 to 1 ratio. The engine is a $3\frac{1}{4}$ by $4\frac{1}{2}$ in. straight eight. The tests were made with a water-outlet temperature of 180 deg. F. and a locked carburetor setting, and the fuel used was a standard gasoline.

It will be observed from Fig. 2 that in spite of the difference of 0.4 in compression ratio, reflected in a 5.5 per cent gain in both maximum torque and horsepower, "borderline detonation" never occurred in head B at less than maximum-power spark advance, while considerable spark retard was required for head A, with consequent loss in torque at "borderline knock." (Fig. 1.) Whereas with head A, objectionable knocking occurred at maximum-power advance at most speeds, with head B it was necessary to advance the spark to the point of one lb. loss to cause objectionable knocking.

The performance of this engine with head B—otherwise a stock engine—should be noted. The maximum corrected horsepower of 119 at 3600 r.p.m. corresponds to a specific output of 0.4 hp. per cu. in., and the maximum torque of 210 lb. ft. at 2400 r.p.m. to a b.m.e.p. of 106.5 lb. per sq. in. The specific fuel consumption reaches a minimum of 0.55 lb. per b.hp.-hr., at 2800 r.p.m., corresponding to an indicated thermal efficiency of 30.5 per cent. There was a complete absence of high speed miss, which with head A was quite pronounced at 3600 r.p.m.

High compression tends to aggravate the shock load, because it directly increases the cylinder pressures, and the higher pressures and higher temperatures increase

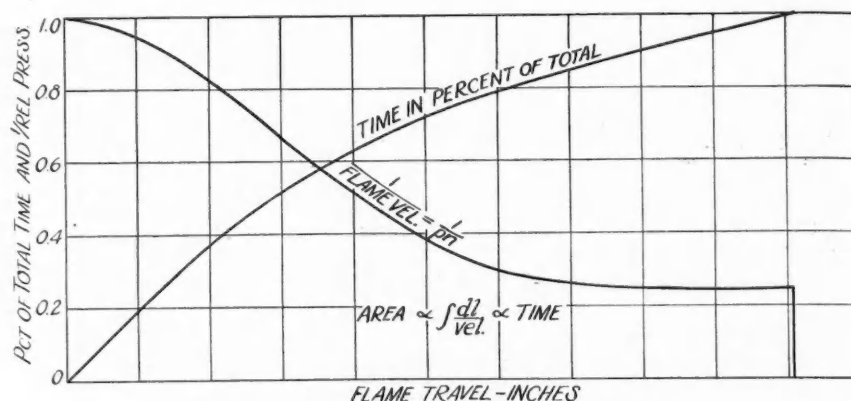


Fig. 5—Flame travel in relation to time

the combustion rate, which further increases the maximum pressure. As in the case of detonation, roughness is objectionable on more serious grounds than its unpleasant reaction on the operator. Since the shock load is produced by the pressure rise of combustion, it is perhaps natural to jump to the conclusion that the maximum rate of pressure rise is the determining factor, but we found that when we designed combustion chambers to give a maximum rate of pressure rise, the result was increased roughness. Further experimentation led to the conclusion that smooth operation can be assured by keeping down this acceleration.

No single feature of the pressure-time characteristic will give a true quantitative gage of the shock load, an integration of the entire characteristic being required.

Maximum smoothness consistent with high efficiency results from uniform acceleration up to the maximum rate of pressure rise. It will be found that uniform acceleration usually brings about a satisfactorily low value of maximum rate of pressure rise.

Having determined the characteristic most desirable from the standpoint of smoothness, it remains to find a combustion chamber form that will give it. Since the unburnt gas during combustion is isothermally compressed and the burnt gas follows the relation $PV^n = \text{constant}$, the relation between the burnt gas volume and the pressure can be readily found. This fundamental relationship is shown in Fig. 3, it being assumed that the characteristic "n" for compression of the unburnt gas is 1.25 and that the ratio of maximum pressure to initial pressure is 4.13, as determined from average practice.

Thus, if we determine by calculation the proportion of the total volume that is occupied by the burnt gas for any position of the flame front, this relationship defines the corresponding relative pressure. In applying this to a combustion chamber, the flame front is assumed to be substantially spherical in shape, and the validity of this assumption is borne out by the agreement of the theoretical result with practice, as illustrated in Fig. 6.

If we now apply this procedure to a given chamber, as in Fig. 4 calculating the burnt gas volume in per cent of total at successive flame front positions, and using the fundamental relation of burnt gas volume and pressure of Fig. 3, the curve of pressure vs. flame travel can be plotted. It still remains, however, to correlate the pressure with time.

It is a fundamental that the reaction velocity or the weight of reagents burnt per unit of contact area per unit of time increases directly with the density of the reagents and as some power of their temperature greater than unity. From the relation $PV^n = \text{constant}$, the variation in reaction velocity and, hence, in flame velocity

(Turn to page 419, please)

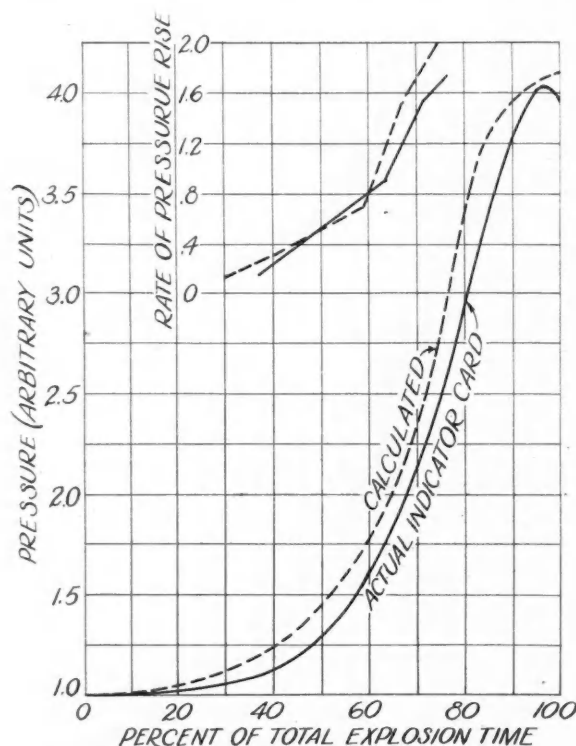


Fig. 6—Comparison of actual and calculated pressure-time characteristics

Table I
Order of Popularity of Twelve Sizes
British New Car Registrations. June, 1927, to Nov., 1928

Period	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th
June-Aug. 27	12 hp.	8 hp.	14 hp.	13 hp.	11 hp.	10 hp.	18 hp.	16 hp.	24 hp.	15 hp.	7 hp.	9 hp.
Sept.-Nov. 27	12 hp.	14 hp.	8 hp.	13 hp.	11 hp.	16 hp.	18 hp.	10 hp.	24 hp.	9 hp.	7 hp.	20 hp.
Dec.-Feb. 28	12 hp.	8 hp.	13 hp.	14 hp.	16 hp.	9 hp.	15 hp.	10 hp.	20 hp.	18 hp.	11 hp.	21 hp.
Mar.-May 28	12 hp.	8 hp.	13 hp.	14 hp.	9 hp.	18 hp.	16 hp.	15 hp.	10 hp.	11 hp.	20 hp.	24 hp.
June-Aug. 28	12 hp.	8 hp.	13 hp.	14 hp.	9 hp.	16 hp.	18 hp.	15 hp.	10 hp.	11 hp.	20 hp.	21 hp.
Sept.-Nov. 28	12 hp.	8 hp.	14 hp.	16 hp.	13 hp.	18 hp.	9 hp.	15 hp.	10 hp.	24 hp.	21 hp.	17 hp.

British Registration Figures Show Growing Popularity of Light Sixes

THE latest returns issued by the British Ministry of Transport concerning new car registrations, covering the period Sept. 1-Nov. 30, last year, show a big increase in the percentage of sedans and other closed types of bodywork, viz., from 69 to 78 as compared with the preceding three months (June 1-Aug. 31). During the corresponding period of 1927, the percentage of sedans exceeded 50 for the first time, then being 59 per cent.

Analyzing the last six three-monthly returns applying to new car registrations only, it is found that the 12 hp. rating has been first in popularity in each one, although since Sept. 1, 1927, its percentage has fallen progressively from 25 to 16.8. With the exception of one period (Sept.-Nov., 1927), cars of 8 hp. rating have been second in the list, the percentage remaining steady between 15.5 and 16.7. The 14 hp. cars were third in the first and last of the six periods. The British tax rating formula, it may be recalled, is D²N D being 2.5 the cylinder bore in inches and N the number of cylinders.

The order of popularity in regard to the first 12 places each quarter is shown in the accompanying Table I, whence the fol-

lowing facts emerge: Comparing the first and last of the six periods covered by the table, the 9 hp. rating gained 5 places, 16's and 17's gained 4 places, 15's and 21's gained 2 places and 18's gained 1 place; the 11 hp. models dropped 11 places (carrying them below the twelfth position and out of the table), 7's dropped 5 places and out of the table, 10's dropped 3 places and 13's and 24's 1 place. The 12, 8 and 14 hp. models remained unchanged in first, second and third places.

Table II shows the percentages of new car registration in each rating, in the order of popularity during the last period (Sept.-Nov., 1928). The 11 hp. cars, which formed 6.2 per cent of the registrations from June to Aug., 1927, represented only 0.7 per cent from Sept. to Nov., 1928, and are not shown in this table because they are not now among the first 12.

The increase in the percentage of 16's from 3.7 to 10.6 is due to the introduction and increased popularity of the light six. The supremacy of the 12 hp. models is accounted for by the fact that the Morris - Cowley is included in this rating. The 8 hp. cars include the Austin Seven (its British tax rating being 8 hp.), which accounts (Continued on page 419)

Table II
Percentages of Twelve Most Popular Ratings
British New Car Registrations. June, 1927, to Nov., 1928

	June-Aug. 27	Sept.-Nov. 27	Dec.-Feb. 28	Mar.-May 28	June-Aug. 28	Sept.-Nov. 28
Hp.	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
12	16.5	25.0	23.8	23.2	18.6	16.8
8	15.5	14.0	16.0	16.6	16.0	16.7
14	15.0	15.7	13.0	12.0	9.9	10.7
16	3.7	3.6	3.5	4.5	6.2	10.6
13	11.4	12.4	13.4	12.3	10.6	9.0
18	4.4	3.6	2.9	5.0	6.1	5.4
9	2.2	1.4	3.6	5.1	6.8	5.0
15	2.3	1.4	3.0	3.0	4.5	4.2
10	5.4	3.5	2.8	2.9	4.0	3.8
24	2.3	1.8	2.1	1.9	1.9	2.1
21	1.8	1.4	1.7	1.7	1.4	2.0
17	1.5	1.3	1.6	1.8	1.9	1.3

11 hp. dropped from 6.2 per cent at Aug., 1927, to 0.7 per cent at Nov., 1928.

Team-work Will

Says Frederick J. Haynes



Frederick J. Haynes

THE Durant Motor Car Co. will work along sound, constructive lines," said Frederick J. Haynes, newly inaugurated president of that organization, in a special interview with *Automotive Industries* the other day. "Consequently, no major changes are going into effect now. Naturally, however, some shifting of emphasis in certain elements of activity is contemplated."

Trucks will be merchandised more intensively than ever through the regular Durant dealer organization, Mr. Haynes said. Assembly of cars has been discontinued in the Elizabeth, N. J., plant, he continued, but a number of important manufacturing operations, including metal stamping, are being continued there.

Durant Motors plans to build all of its bodies in the future, Mr. Haynes declared, pointing to the completion of its new body plant at Lansing, Mich., as an important step in that direction. Manufacturing activities for all of Durant Motors are being centralized at Lansing, although executive and sale offices have been established in Detroit, where Mr. Haynes has his headquarters.

Definite, consistent and intensive advertising is to be an integral part of the company's marketing plans, Mr. Haynes said, emphasizing four major characteristics to be incorporated in Durant copy, which he believes will make that copy distinctive. Those four characteristics are: Simplicity, modesty of language, understatement rather than overstatement, brevity of copy and consistency of appearance through standardization of typography, set up and uniform illustrations.

On this question of advertising copy, as a matter of fact, Mr. Haynes voiced very definite views. "Pick up any magazine or newspaper today and read the automobile advertisements," he said, "and you are almost certain to come to the conclusion that there is no 'best' automobile because a majority of the advertisements in some way or another declare that the automobile under consideration is the very best that can be produced. The average advertisement, as many students of the subject have agreed for a good while, is filled with far too many high-sounding adjectives and superlatives. To my mind, there is too much of this type of advertising."

"As a matter of fact," Mr. Haynes continued in that slow, quiet tone which characterizes all of his speaking, "these same four fundamentals which we are planning to incorporate in our advertising copy, form a sound basis for every relationship of a manufacturer with either his dealer and distributing organization or with the public. All we need to do is substitute as the fourth point, 'consistency of policy' for 'consistency of appearance'."

"We are going to strive continually to build better automobiles. We are pledging ourselves to simple honesty with the public—that same pledge naturally goes to our dealers. This latter means close team-work between factory and dealer. It is our intention to so

Run Durant Motors

Manufacturing activities are being centralized at Lansing and executive offices in Detroit. Assembly of cars has been discontinued at Elizabeth, N. J.

By Lewis C. Dibble

conduct the Durant sales department as to provide a maximum of service to the dealer in every branch of merchandising and maintenance work. Special help as regards accounting methods will be one of the most important elements in this service immediately."

Mr. Haynes talked readily about future plans for the commercial car activities of his organization. In that field, both Mr. Haynes and a number of the other new Durant executives have had a wide experience as well as a long record of successful achievement.

"A great deal of time and attention will be devoted to the commercial car end of the Durant business," Mr. Haynes said. "Durant commercial vehicles will be merchandized intensively through the regular Durant dealer organization.

"A dealer in our price class has a wonderful advantage in selling trucks," he went on. "It costs him little extra to maintain a truck service department and to take care of the accounting and other special items which are needed to provide an effective truck merchandising organization. His overhead is not materially increased. In other words, a line of good trucks helps definitely to reduce the overhead per cent of sale. It helps out the dealer very substantially in his net profits.

"Will you cease manufacturing activities at Elizabeth and what changes will be made in other plant operations?" Mr. Haynes was asked.

"You must realize," he answered, "that we have been in active management of Durant Motors for only a few weeks. During that period most of our time has been spent making a careful survey of manufacturing and merchandising policies. Just what program will be followed will of necessity be regulated by future needs. It is our theory, however, that manufacturing must be scheduled purely on economic grounds. No one can say just what the future policies will be, but whatever they are they will be

treated purely from the economic angle.

"As far as the Elizabeth plant is concerned, not many seem to realize that a number of important operations are still located there. As an example, the metal stamping department, which makes all metal stampings for Durant Motors, is still located at Elizabeth. It occupies something like five acres of floor space and it appears there will be no need in the immediate future for moving it elsewhere unless it can be determined that some economic advantage might accrue from so doing. Besides the metal stamping department, the engineering department and several other important activities are still located at Elizabeth.

"During the last six months, work has been going ahead steadily on the new body plant at Lansing. It is our aim to build all of our own bodies. Of course, if business should expand to such a point that we could not manufacture all we require, then we might have to go outside for a part of the supply, but that is not in the plans as they stand.

"Durant Motors, Inc., includes Durant Motors of New Jersey, which owns and operates the big plant at Elizabeth, N. J.; Durant Motors of Michigan, which operates the Durant plant at Lansing, which will become the operating headquarters for the entire Durant group;

Durant Motors of Canada, which manufactures automobiles in its modern plant near Toronto, and Durant Motors of California, which owns the plant at Oakland, Cal., that fills practically all the Durant requirements on the Pacific Coast and in the Far West. Besides these car manufacturing divisions, there are the New Process Gear Co., at Syracuse; the Adams Axle Co., also at Syracuse; the Warner Transmission Co., at Muncie, Ind., and the American Plate Glass Co., at Kane, Pa.

"There is no question but that Michigan is the logical center of the industry. Trained men are al-



The Maccabee Building in Detroit where Durant Motors has established executive and sales offices

ways available in this territory, due to the extensive automobile manufacturing operations in the state, and it is largely for this reason that it has been decided to establish the corporation's headquarters at Lansing, which is one of the well-known manufacturing centers and also where Durant has a plant that is modern in every detail."

"Will all executives' offices be located in Lansing and do you expect to make your home there?" Mr. Haynes was asked.

"It is the plan to centralize manufacturing activities for all of Durant Motors in the company offices at Lansing. We will, however, establish executive and sales offices in the Maccabee Building, Detroit, from which all the diversified activities of Durant Motors will be directed and supervised. This, of course, means that I will continue to make my home in Detroit, although, of course, much time will be spent at the various Durant units and especially at Lansing."

"What policies do you and your associates intend to follow in the future management of Durant Motors?" was the next question. Mr. Haynes paused a moment, then in carefully measured words, came the reply:

"It might be said that the new management is not new in any sense of the word. New to Durant, perhaps, yes. But most of us were associated for years at Dodge Brothers. We have worked together and faced a number of important problems and issues together. Whatever we accomplished was the result of team-work and harmony. This team-work is going to exist in the management of Durant Motors. The new men in the company and those who are remaining from the original Durant organization, and there are many of them, are going to put their shoulders to the wheel.

"There will be no 'I's' in the organization. There is not a wizard or a magician in the entire industry. Whatever has been accomplished by any company has

not been the result of sole effort of any one individual. It has been the fruition of team-work and a common understanding of the problem at hand, so I might say right here that whatever we may accomplish in Durant Motors will come from cooperative effort."

For years, Mr. Haynes has been an outstanding figure in the industry. In fact, his experiences date back to the bicycle days, for it was in 1900 that he became assistant to the late John F. Dodge, who was then manager of the National Cycle & Automobile Co. of Hamilton, Ont. Upon Mr. Dodge's removal to Detroit, Mr. Haynes succeeded him as general manager. Mr. Haynes first was associated with the automotive industry as works manager of the Franklin Automobile Co., a post he left in 1912 to take a similar position with Dodge Brothers. Upon the death of the Dodge Brothers in 1920, he succeeded to the presidency, and, when the company was sold to the Dillon-Read interests, he was made chairman of the board of directors, a position he continued to fill until his resignation last summer when Dodge Brothers was acquired by Walter P. Chrysler.

Mr. Haynes has been joined in Durant Motors by many of his associates with whom he accomplished so much at Dodge Brothers, and, from his present attitude, one gains the impression that he and his associates will carry out in many respects, a number of the policies which they practiced so successfully in their previous connection.

A. I. Philp, chairman of the board of directors, is very active in the direction of the company's affairs and also has offices in Detroit. R. A. Vail, vice-president, is in charge of engineering and production, dividing his time between Elizabeth, Detroit and Lansing. J. A. Nichols, Jr., secretary-treasurer, is in the new Detroit offices. R. T. Hodgkins, general sales manager, and his staff are also established in Detroit.

Front-Wheel Drive Car is Produced in France

A FRONT-WHEEL drive car, carrying the six-cylinder Hispano-Suiza engine and having four independently sprung wheels, just has been produced in Paris by Andre Dubonnet, wealthy French sportsman.

The chassis has been designed to incorporate the patented front wheel drive features of the Tracta automobile, under which the normal front axle is replaced by two parallel steel tubes united at their ends by guides for the steering pivots. There is a double universal joint on each drive shaft and the front suspension is by coil springs, with hydraulic damping, having a certain resemblance to that of the Lancia.

The engine is the Hispano-Suiza six-cylinder model of 4.33 by 5.51 in. bore and stroke, having a new type high-compression piston and steel cylinder liners treated by the nitriding process. The clutch is in front of the engine and the three-speed transmission is ahead of the axle construction, so that the overall length of the hood is no greater than with normal rear wheel drive. No axle is used at the rear, each wheel being attached to the frame by means of a radius arm and suspended by a coil spring contained within a cylinder on the chassis frame. By reason of the absence of mechanism behind the dash, the gasoline tank can be mounted within the frame, under the driver's seat. Hispano-Suiza brake drums are used at the rear, while at the front external contracting brakes are employed

with the drums on the inner ends of the driveshafts so as to reduce unsprung weight.

This construction makes it possible to secure a very low overall height, the Dubonnet six-passenger sedan having a total height of 63 in., with ample internal headroom. The body is of all-aluminum construction without framework. The hood is built to enclose the front wheels, while the spare wheels are carried in a compartment under the hood, by the side of the engine, and are out of sight. The battery is placed in a forward position by the side of the engine, to help increase the load on the driving wheels. The headlights also are enclosed within the engine housing, being uncovered only when required for illumination. While the passenger-carrying portion of the body follows normal lines, the front-wheel drive construction makes it possible to employ an important amount of space behind the rear wheels and extending down to the lower flange of the frame members for housing baggage. This baggage compartment is streamlined with the body.

Although having a wheelbase of 129 in. and an engine of 488 cu. in. developing nearly 200 hp., it is claimed that the front-wheel-drive Dubonnet weighs only 3300 lb. After the tests on this car have been completed, a similar machine with a shorter wheelbase will be produced and will be driven by Dubonnet in the Targa Florio race in Sicily next May.

Factory Organization and Control Discussed by A. M. A.

Theoretical organization line-ups are usually subsidiary to practical capacities of personnel. Coordination of independent departments is important.

By K. W. Stillman

ALTHOUGH there was no very general agreement, the production executives who attended the Pittsburgh meeting last week of the Production Executives' Division of the American Management Association seemed to feel that, to a large extent, the particular method of organization and control to be exercised in any factory depends upon the personalities involved rather than upon the formulation of theoretical lines of authority and control.

The meeting, in which the Management Division of the American Society of Mechanical Engineers cooperated, was devoted to the general topic of factory and operating organization with particular reference to specialists in industry and their relationships with the line organization and with each other.

One session was devoted to a discussion of research and development departments to determine just where they should be placed in the organization for best results. C. S. Redding, vice-president in charge of development, Leeds & Northrup Co., believes that such a department should not be responsible to the factory organization, as such a condition might tend to retard development in favor of better manufacturing conditions.

With the research department independent of the factory, however, there is likely to arise many points of friction between the two, such as the cost of new work and the disposal of inventory made obsolete by a new design. In such cases, and, in fact, in all other instances where there are sources of friction between independent departments, J. M. Hipple, works manager, Westinghouse Electric & Mfg. Co., recommended the introduction of groups made up of the responsible heads of the departments involved as coordinating agencies. Since the members of such a group usually have the necessary authority to carry out its mandates, their action would settle many disputes without the necessity

of carrying them to the company officials who may have definite authority over the opposed departments.

In a similar discussion on the status of maintenance and repair departments, the same conclusion was reached—that, while details of methods and organization vary widely among different plants, the ability and personality of the man at the head of the department determine to a large extent his duties and responsibilities.

The necessity of budgeting all maintenance and repair work was emphasized by several speakers, although some question was raised as to whether the indiscriminate use of budgets might prevent spending enough money on this work to keep the plant in the best condition. This point was demonstrated to be a matter of administration. The first requirement of maintenance work, as well as all other types, should be that the work is done properly. To obtain this result with a budget, possibly tending to produce cheaper work, is the responsibility of the administrative organization.

The example of the automotive industry in putting maintenance work secondary to the fact that machine tools are the cheapest equipment a manufacturer can buy was presented very forcibly at the meeting. It was pointed out that too frequently manufacturers nurse machinery in order to make it last as long as possible, whereas the automotive industry, in general, knowing that the machine will probably become obsolete before it is worn out if treated this way, strives to work it as hard as possible and, while still maintaining it in good condition, tries to wear it out in productive work as quickly as possible.

A very interesting session was devoted to the subject of placing recent college graduates in industry. The consensus was that they should be passed through a training course in industry after their graduation and that, on the whole, they are as much of an asset to the business as any other new employee.

Thoughts From the American Management Association Meeting

Distinguish between the division and the control when setting up an organization.

Distinguish between centralization of control and of performance.

Give authority with responsibility.

Use groups to coordinate independent activities.

Divide organization according to personalities involved to get best results.

Make the inspection department a constructive manufacturing agency rather than a mere reporter of defective work.

Redesigned Chassis Lubricating System Operates From Car's Kinetic Energy

Vehicle vibrations are utilized to propel pumping unit through the medium of an inertia weight. Reservoir of device needs refilling only every 2000 miles.

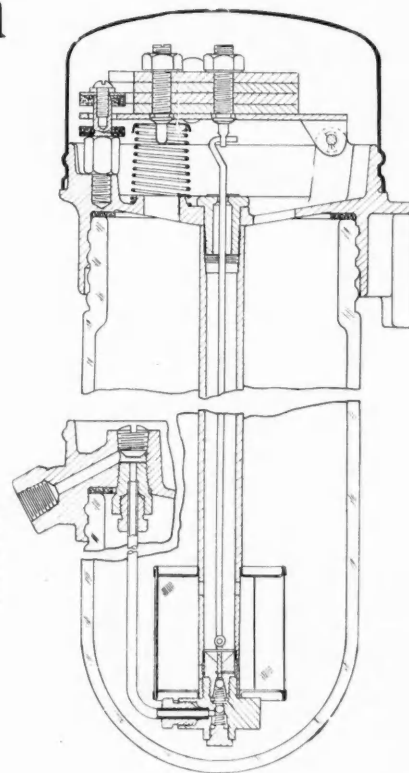
THE Bassick Manufacturing Company of Chicago some time ago put on the market a chassis lubricating system which is entirely automatic, the force required for feeding the oil to the various bearings being derived from the kinetic energy of the vehicle. The system comprises a central pumping unit in which there is an inertia weight that is set vibrating by the vibrations of the car. This pumping unit has been redesigned recently. A sectional drawing of the unit and a top view with the metal cap removed are shown herewith.

The inertia weight and pumping unit are enclosed in a glass bowl with a removable metal cap. The glass bowl holds $4/5$ of a quart of oil, enough for approximately 2000 miles of driving. The amount of oil in the unit is always visible through the glass bowl. Oil is poured in at the top of the unit after the metal cap is removed.

The inertia weight is hinged under the metal cap and balanced on a spring. Such a spring-suspended weight has a fixed frequency of vibration, independent of the speed of the car. The amplitude of vibration of the weight is limited by two stops with soft facings. The weight responds by oscillation to the slightest movement of the car. A floating plunger rod operating inside a brass tube connects from the inertia weight to the actual pumping unit in the bottom of the glass bowl. To prevent the entrance of solid particles in the oil into the pump, the latter is surrounded with a metal gauze filter of 150 mesh.

When the plunger is near the upper end of its

Fig. 1—Vertical section through pumping unit of Alemite automatic chassis lubricating system



stroke, oil enters the pump barrel through an inlet port in its wall, and during the down stroke of the plunger this oil is forced past two ball check valves into the distributing line. The pressure maintained in the distributing line by continuous pumping forces the oil to all of the connected bearings of the chassis, the oil entering those bearings through resistance units. Owing to the very small diameter of the pump plunger and the considerable mass of the inertia weight, a high pressure is maintained on the oil. The pump is believed to be the smallest manufactured, its rate of delivery being one drop of oil for every 40 to 50 strokes. It is claimed that as a result of the high pressure in the line together with the small delivery of the pump, efficient, continuous lubrication is furnished without waste of oil.

There are only four moving parts in the central unit. Their bearing surfaces are case-hardened and they operate in oil, hence wear is reduced to a minimum. This has been confirmed by laboratory endurance tests equivalent to 200,000 miles of road service. It has also been shown that severe car vibration on rough roads will not injure the mechanism of the unit.

The delivery of the pumping unit can be varied by adjustment. If the screw at the center of the inertia weight (to which the pump plunger is connected) is turned clockwise, the delivery rate is increased, while if turned counter-clockwise, it is decreased. The manufacturer states that there is no possibility of the oil screen in the pumping unit becoming clogged, as the entire amount of oil that will pass

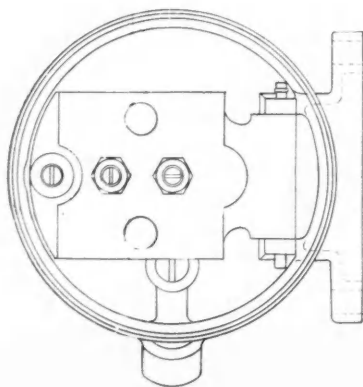


Fig. 2—Top view of pumping unit with metal cap removed

through the unit during the life of the car is only 5 to 6 gal., and this quantity of oil will not hold impurities sufficient to clog the 6 sq. in. of surface of the screen.

Fig. 3 shows a sectioned view of the resistance unit, one of which is connected in the line at each bearing and serves to regulate the amount of oil received by it. Each resistance unit has a fine passage through it in the form of a helical groove through which the oil must pass. The helical groove is about 8 in. long, and it creates the same resistance to oil flow as a very fine tube would. The actual pressure built up in the line depends to a large extent upon the viscosity of the oil, which in turn is dependent upon the temperature under the engine hood.

A wire screen of 150 mesh is inserted in each resistance unit, chiefly to prevent any dirt which may be in the line when it is assembled, from getting into the helical passage. Each resistance unit also is provided with a check valve, to prevent draining of the system. Some of the bearings of the chassis are lo-

cated at a higher level than others, and this tends to cause the oil to run out of the lower bearings and draw air into the higher ones, thus draining the distributing line. The problem of producing a check valve that should effect an oil-tight seal under the very slight hydrostatic pressure due to the difference

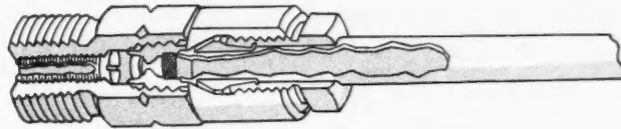


Fig. 3—Cutaway view of resistance unit

in level of different chassis bearings, was found to be a quite difficult one, but it was solved by the use of a very soft material for the valves.

For use with this system, the manufacturers recommend any good crankcase oil with a low cold test. A heavy grade oil should be used in winter and an extra heavy grade in summer. The oil used with the system should have a Saybolt viscosity of at least 750 seconds.

New Automatic Clutch Control Developed

A GERMAN engineer, Herr Erdelen, has developed a system of automatic clutch control for which it is claimed that it tends to greatly facilitate car driving. As shown in Fig. 1, the system includes a cylinder *C* with piston *K*, which is connected by a pipe *R* with the inlet manifold *A* of the engine. A three-way valve *N* and a rotary control valve *U* are included in the pipe line. The three-way valve permits of disconnecting the cylinder from the intake manifold and putting the automatic control out of action. Valve *U* is connected by a link *Q* to the accelerator pedal, the connection being so designed that with the accelerator in the idling position the intake manifold communicates with cylinder *C*. This is shown in Fig. 1, and it will be seen that the slightest movement of the pedal will interrupt this connection by turning the valve, which simultaneously opens a port to the atmosphere.

With the engine idling, the powerful suction in the manifold will create a vacuum in the cylinder *C* and cause the piston *K* to be drawn in. The latter connects through a link *P* with the clutch lever, and when it is drawn into the cylinder it disengages the clutch.

If now the accelerator pedal were depressed, air would rush in at the air port of the control valve, and since there would then be nothing to hold the piston in the cylinder, the clutch would take hold very suddenly, probably stalling the engine. In order to prevent this, two dashpots *E*₁ and *E*₂ are provided, as shown in the illustration. These have a small adjustable air valve *B*, through which air can enter the cylinders only slowly,

thus retarding the movement of piston *K* in cylinder *C* and the engagement of the clutch. When the clutch is being disengaged, the air valves *V*₁ and *V*₂ in the heads of the dashpots open, thus permitting of a quick disengagement.

An important feature of the system consists in the slotted connection to the carburetor at *L* and the spring-stop *D*. Suppose that the car is running at considerable speed and that it is desired to slow down. The ordinary procedure consists in releasing the accelerator pedal. But with the Erdelen device, if it did not incorporate the parts just mentioned, this would result in disengagement of the clutch, and with the engine disconnected the car would lose speed only very gradually and coast a long distance. The slot *L*, however, permits of fully closing the throttle without altering the position of valve *U*. Only when the accelerator pedal is allowed to return fully to the zero position will the manifold connection with the clutch cylinder be established and the clutch disengaged. The spring stop serves only as a guide for the driver. It is so arranged that when the accelerator is being pressed down, it begins to offer a slight but perceptible resistance as soon as the freedom allowed by slot *L* has been taken up and the throttle begins to open. Thus when the driver feels that the retracting force of the pedal is decreasing, he knows that the throttle is closed and that any farther backward movement of the pedal would allow the clutch to open.

The use of the system does not entail any great change in normal driving practice, except in starting the car from a standstill, for instead of opening the throttle gently and simultaneously allowing the clutch to engage gradually, one needs only to operate the accelerator, which, however, must be pressed down somewhat quicker than usual, so the engine will pick up sufficient speed before the dashpots allow the clutch to engage fully. The fact that with this system there are only two pedals to operate, the brake and the accelerator, is an advantage that is appreciated especially by novice operators, while in driving in hilly country it is valued even by the seasoned driver, for starting a car smoothly on a steep up-grade from a standstill is an operation that calls for unusual skill.

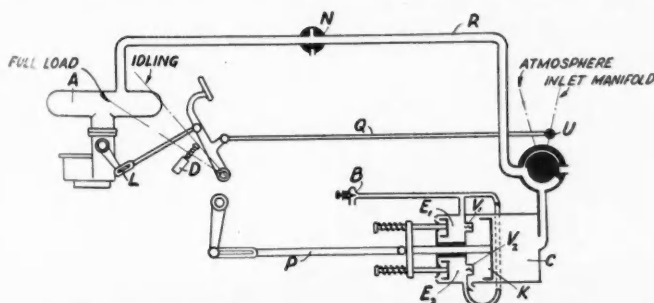


Fig. 1—Diagram of Erdelen automatic clutch control system

New Compensating *Piston Supported At Top by Ring and Invar Bar*

Feature intended to eliminate looseness and consequent piston slap at low engine temperatures. Control member also prevents "cocking" in the cylinder.

A NEW type of aluminum-alloy piston with special provisions to compensate for the difference in thermal expansion of aluminum and cast iron and for the differences in temperature reached in service by different parts of the piston, is being produced by the Sterling Products Corp., of St. Louis, Mo. It was developed by P. L. Bowser, president, and John Flammang, vice-president, of the Sterling Products Corp. It already is in large production for original equipment.

Two sectional views and an end view of the piston are shown herewith. The design differs from conventional pistons chiefly in two respects. At the open end, the piston is not round but slightly larger in diameter in the plane of connecting rod sweep than in the plane through the piston pin axis. At the head end, the piston bears on the cylinder wall through a cast iron ring, which is rigidly supported by a flat invar steel insert held central with respect to the piston by being anchored at the center of the head, and passing through slots milled at the bottom of the ring groove.

The open end of the piston, as mentioned, is non-circular, and its major diameter is 0.003 in. larger than the bore of the cylinder. When the piston is introduced into the cylinder it naturally is compressed in the direction of the major axis of its cross-section, and when the temperature of this part of the piston is only very slightly above that of the cylinder wall, the effective bearing area extends over that portion of the piston marked Zone 1. With increasing temperature difference between piston skirt and cylinder wall, the piston expands relative to the cylinder and the effective bearing area increases. The average clearance of Zone 2 at normal temperature is 0.004 in. and a temperature difference of 80 deg. F. suffices to bring this part of the skirt area into contact with the cylinder wall. Zone 3 has an average clearance at normal temperature of 0.006 in. and expands into contact with the cylinder wall at a temperature difference of 126 deg. Similarly, Zone 4 requires a temperature dif-

ference of 145 deg. to expand into contact with the cylinder wall.

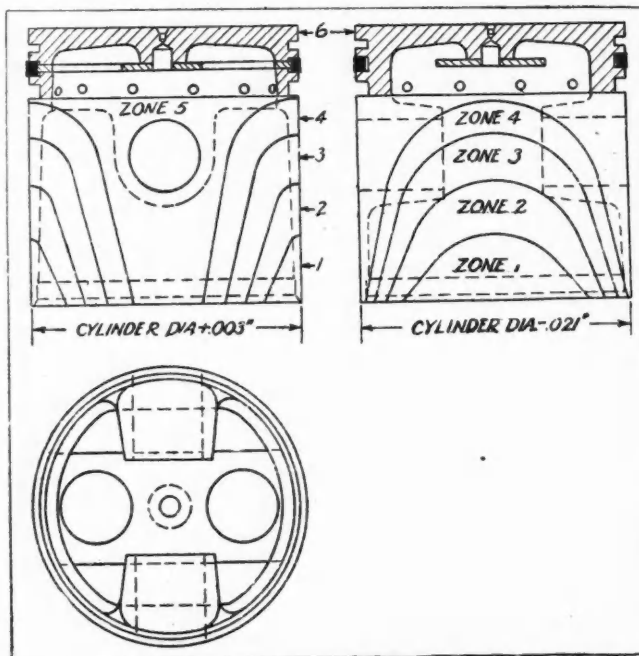
Zone 5, which is that portion of the piston skirt over the ends of the piston bosses, is machined with a clearance of 0.010 in. and expands into contact with the cylinder wall at a temperature difference of 168 deg. Zone 6, the upper end of the piston, is machined with a clearance of 0.024 in. and requires a temperature excess of 424 deg. to expand up to the diameter of the bore.

The invar steel insert expands about the same as or less than the cylinder bore up to normal working temperatures, and permits of fitting the ring supported by it with zero clearance in the cylinder bore. The insert is anchored to the piston head at the center and has a free fit in the slots at the bottom of the ring groove. Owing to this close fit of the ring supported by the invar insert and the large clearance of the ring-belt portion of the piston in the cylinder, the upper end of the piston is supported in the cylinder bore solely by the invar supported ring, and its fit in the bore is entirely independent of the thermal expansion of aluminum.

As to the operating conditions of the piston, the manufacturers state that under wide-open throttle and at maximum operating temperature, zones 1, 2, and 3 are in approximate contact with the cylinder wall, from

which they are separated, of course, by the oil film. The elastic forces of the material of the skirt cause a large portion of its surface to conform to the surface of the cylinder bore, although in the free state this end of the piston is non-circular. It is claimed for the piston that the large contact area of the skirt under full load conditions, together with continuity of the skirt and the ring belt results in a ready flow of heat from the head into the skirt and thence to the cylinder wall and engine jacket.

As the piston ring over the invar steel insert is fitted into the cylinder with zero clearance, there is no chance for looseness and consequent piston slap at any engine temperature.



Three views of Sterling pistons

This ring, which is referred to as a control ring, acts as a cross head and prevents "cocking" of the piston in the cylinder bore, which is claimed to be responsible for rounding of piston ring edges and consequent loss of compression. Owing to the low temperature coefficient of the invar insert at the top end, and the elastic deformability of the skirt at the open end, substantially the same clearance conditions are maintained under all working conditions. This makes possible a short and light piston.

In order to keep down the number of different designs that may be called for, the Sterling Products Corp. has evolved the following "Recommended Practice" for the guidance of designers. All of the pistons listed (nine sizes) are designed for three rings. The skirt lengths are made equal to 75 per cent of the bore and the bearing load due to angularity of the connecting rod is divided between the control ring and the skirt in the proportion of 60 to 40.

Recommended Practice for Sterling Three Ring Pistons

Part No.	Dia-meter	Length	Com-pres-sion	Pin Dia-meter	Thrust Sec-tion	Boss Spacing	Ring Grooves
52	3"	3 1/8"	1 1/2"	3/4"	2 1/8"	1.200"	1/8"-3/8"-3/8"
54	3 1/4"	3 3/8"	1 5/8"	5/8"	2 5/8"	1.300"	1/8"-3/8"-3/8"
56	3 1/2"	3 5/8"	1 3/4"	7/8"	3 3/8"	1.400"	1/8"-3/8"-3/8"
58	3 3/4"	3 7/8"	1 7/8"	5/8"	3 7/8"	1.500"	1/8"-3/8"-3/8"
60	4"	4 1/4"	2"	1"	3 5/8"	1.600"	1/8"-3/8"-3/8"
62	4 1/4"	4 3/8"	2 1/8"	1 1/8"	3 3/4"	1.700"	3/8"-1/4"-1/4"
64	4 1/2"	4 5/8"	2 1/4"	1 1/8"	4 1/8"	1.800"	3/8"-1/4"-1/4"
66	4 3/4"	5"	2 3/8"	1 3/8"	4 3/8"	1.900"	3/8"-1/4"-1/4"
68	5"	5 3/8"	2 1/2"	1 1/4"	4 3/4"	2.000"	3/8"-1/4"-1/4"

Compression Pressure Affects Thermal Efficiency

(Continued from page 410)

can be expressed as a function of some power of the pressure. The value of the exponent as experimentally determined lies in the range of 1/3 to one, varying with different types of chambers. The less the rate of temperature rise of the unburnt gas during combustion, the less will be the acceleration of flame velocity. For this reason, the better the cooling provided by the chamber walls upon the unburnt gas, the smaller will be the value of the exponent.

In determining the relative time during combustion corresponding to each flame front position, a graphical method can be used, as shown in Fig. 5. Since time is obtained by dividing distance by velocity, if the reciprocal of velocity is plotted against distance of flame travel, the area will represent time. By taking the area under the curve at successive flame front positions, and dividing by the total area, the corresponding per cent of total explosion time is obtained, as shown in the curve marked time. It then remains only to plot the pressure against the corresponding per cent of total time to obtain the resultant pressure-time curve.

Fig. 6 shows this calculated curve compared with an actual indicator card obtained from the same combustion chamber. It will be seen that while the two curves do not coincide, they are substantially parallel, while the pressure rise curves are similar. The somewhat higher maximum rate of pressure rise and maximum pressure for the calculated curve are due to the fact that piston movement which tends to lower both these quantities was not taken into account in the calculation, since it has little effect on the vital part of the curve. The agreement as to the factors determining the shock tendency seems to be unquestionable.

It is thus possible to predict the pressure-time characteristics for any combustion chamber with reasonable assurance, provided the constants for the general type are known. In this way, the cut and try process required to obtain a smooth characteristic can be confined to paper and the final result insured.

It is evident from the diagrams that increasing the length of flame travel in the main chamber of the offset type head, by making the chamber less compact, will reduce both the acceleration in pressure rise and the maximum rate of pressure rise. There are definite limits

to the extent to which this "non-compactness" can be carried with high compression, however, both because the chamber tends to become too shallow, and because the explosion time may be increased to the point of loss in efficiency. Reliance, therefore, must be placed on the proper distribution of the volume with respect to the firing point.

British Registration Figures

(Continued from page 411)

for this size holding second place. As the new Morris Minor is also rated at 8 hp., it is probable that this class will head the list in the returns this year. It will be noted that there is very little change in tabulated position or percentage of ratings that include the smaller sizes of American cars (21 and 24 hp.), but the 15's, which include the new small bore Ford, as well as one or two light sixes of British and European makes, have crept up (from 2.3 per cent to 4.2 per cent) in the full period covered by the tables.

As regards the total number of passenger car registrations, new and renewals, the most recently issued census of these covered the 12 months ended Sept. 30 last and shows an increase of 98,035 applying to England, Wales and Scotland. English registration increased 12.7 per cent; Welsh, 11.1, and Scottish, 10.9. This compares with a percentage increase of 15 per cent during the preceding 12 months (1926-1927) for the whole of Great Britain.

Motorcycle registrations increased by 31,173 (4.5 per cent). During the previous 12 months the increase was at the rate of 6.6 per cent.

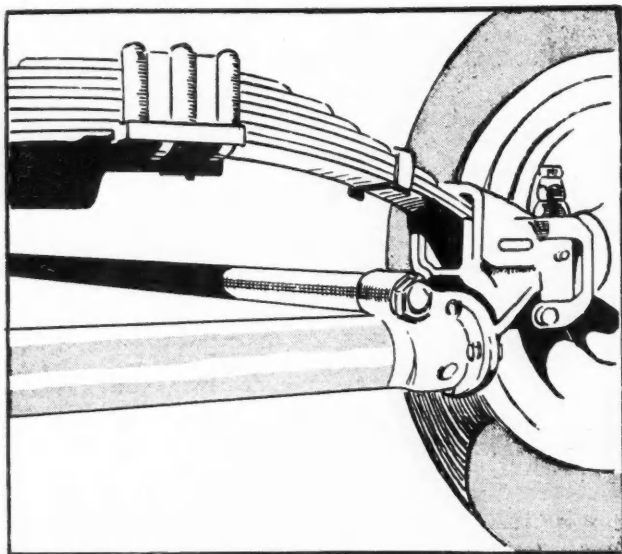
Gasoline trucks increased last year by 10,903 (4 per cent); steam trucks were fewer, showing a drop of 416 (5 per cent). Buses and coaches increased by 3840 (9 per cent).

Rigid six-wheeled trucks increased from 57 to 183. No separate figures were given in the official returns of six-wheeled buses and coaches. Agricultural tractors slumped badly; last year only 333 were registered as against 1744 in 1927.

NEW DEVELOPMENTS—Automotive

New Front Axle Design

A MODIFICATION of one of its standard six-wheel chassis has been built by Karrier Motors, Ltd., of Huddersfield, England, to meet the requirements of the Government of India. The new chassis is designed so as to be suitable for cross-country transportation.



Tubular front axle and transverse spring of Karrier Colonial six-wheeler

The principal changes as compared with the stock model consist in moving the controls forward at the side of the engine, increasing the engine power and the cooling system capacity, lengthening the wheelbase to permit of the use of a longer body with a minimum of overhang, and providing an improved system of transverse springing for the front axle which permits great freedom of front axle movement. This system permits one front wheel to rise 22 in. above the level of the other without tending to twist the frame or stress other chassis units.

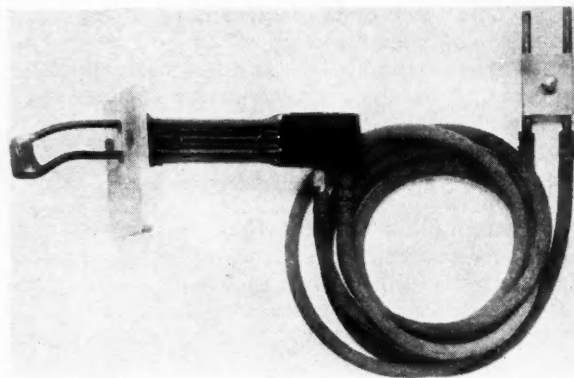
To make possible this wide range of front axle movement the axle is placed slightly ahead of the radiator, and the mudguards, of course, had to be placed unusually high. While this forward location of the axle increases the wheelbase somewhat, it is claimed that the turning circle of the chassis is affected only very little.

A heavy-gage steel tube forms the front axle center,

which has flanged collars at both ends on which are formed lugs for the radius rod connection and to which the axle ends are bolted. The transverse spring is carried by a heavy trunnion bracket on the frame front cross-member, one end of the spring being connected to the axle by a spring bolt while the other end is free to slide. The radius rods, which control the position of the axle relative to the frame, are secured to suitable brackets on the frame. This arrangement, while quite simple, provides great strength as well as exceptionally free movement of the front axle when negotiating surface irregularities.

Lincoln Electrode Holder

THE Lincoln Electric Co., Cleveland, Ohio, has brought out a new type of water-cooled carbon electrode holder for heavy duty manual welding by the carbon arc process. By its use, it is possible to weld with the arc tip of the carbon electrode projecting less than 3 in. from the carbon holder. The new type of



Lincoln water-cooled carbon electrode holder

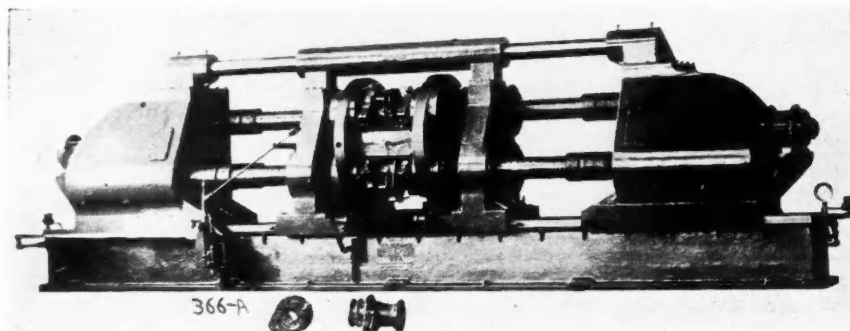
holder weighs only 3¼ lb. and is well balanced and easy to handle. The carbon holder consists of a coiled copper tubing through which water constantly circulates. Holders are manufactured in sizes for use with ¼ in., 5/16 in., ¾ in. and 1½ in. carbons.

Two-Way Boring Machine

A PRODUCTION machine specially designed for boring both ends of the cast sleeves for tractor rear axle housings and similar parts is being marketed by the Defiance Machine Works, Defiance, Ohio. A front view of the machine is shown herewith.

Each of the two heads of the machine has three spindles which are located on a circle 29 in. in diameter. The heads are supported in Timken roller bearings and are driven through helical gears. Lubrication of the heads and driving gearing is by splash, all parts being completely enclosed. Each head is driven by a 10 hp. direct connected motor running at 1200 r.p.m.

With the exception of the clamps,



Defiance two-way horizontal boring machine

Parts, Accessories and Production Tools

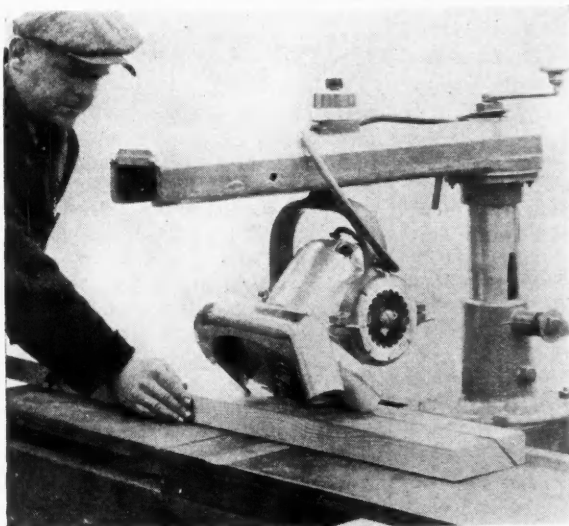
the fixture is cast in one piece. It is mounted in large Timken roller bearings and revolves around the axis of the machine, there being four clamping stations, as follows: One loading station, one station for rough boring, one station for semi-finish boring and the fourth station for reaming. At each station, there are hardened bushings on both sides of the fixture for guiding the boring bars, which revolve in Timken bearings. When loaded, the fixture weighs about 10,000 lb., but it can be indexed readily by one man with one hand.

The boring bars used are $7\frac{1}{4}$ in. in diameter and are inlaid with hardened steel packing strips which are ground to a true fit in the revolving bushings, in the guide housings as well as in the fixture. The height from the sliding ways to the center of the fixture is 28 in.; to the lower spindle, $17\frac{3}{4}$ in., and to the upper spindle, $38\frac{1}{4}$ in. The size of the fixture base is 35 by 89 in., the travel of the heads is 38 in. and all spindles turn at 32 r.p.m.

Oilgear feed is used, and can be regulated to suit requirements. The machine also has an endless conveyor under the fixture which carries all of the borings over to the side. Four electric motors are required, viz.: two 10 hp. motors of 1200 r.p.m. to drive the heads, one 3 hp. 900 r.p.m. motor for driving the Oilgear and one $\frac{1}{4}$ hp. 1800 r.p.m. motor for driving the conveyor and speed reducer, the latter motor being connected to an electric light socket. The production of the machine on the tractor axle carrier is 30 pieces per hour.

DeWalt Wonder-Worker Saw

A NEW all-purpose electric woodworker, known as the DeWalt Junior, has been added to the line of the DeWalt Products Corp., Leola, Pa. Features of this new machine include balanced power, instant change from cross-cutting to ripping without stopping the motor, ripping gages and dials for adjustment to any purpose, and provision for handling a number of distinct cutting operations, such as dadoing, routing, miter-



View of the DeWalt Junior Wonder-Worker saw at work

ing, shaping, grooving, ploughing, rabbeting, mortising, tenoning, gaining, etc.

A 12-in. combination cross-cut and rip saw is standard equipment, with which 2-in. stock can be ripped at the rate of 20 lineal feet per minute. Fitted on a wooden table 29 by 59 in. the machine complete weighs 235 lb. It is compact and portable.

Bendix Duo-Servo Brake

THE Bendix Brake Co., South Bend, Ind., is offering a new type duo-servo brake in which there is servo action for both forward and reverse motion of the car. This type is offered in addition to the Bendix three-shoe servo brake recently introduced. The new two-servo employs shoes of the same size as the three.

At the camshaft are two anchor pins, one of which



Bendix duo-servo brake, shown as seen when wheel is removed

serves as the anchor or buttress for braking to stop forward motion; the other, for braking to stop reverse motion. The two shoes are linked together at a point opposite the cam by a right and left-hand screw passing through articulating pins, in such a manner as to provide for their tendency to align themselves with the braking surface of the inside of the brake drum.

The shoes are expanded by means of a balanced cam, of such design that the cam slope at the point of contact with the cam plates of the shoes remains constant during the entire life of the brake lining. The two trunnion blocks bear on the curved ends of the shoe webs and provide compensation for the movement of the shoes and for unequal wear. When the car is moving forward, the forward shoe acts as the primary shoe and the other as the secondary shoe, while when the car is running backward and the brake is applied, the functions of the two shoes are reversed. The shoes are centralized in the drum to prevent dragging when in the "off" position, by a simple roller eccentric adjusted from the outside of the drum.

First with
the News

Reliable,
Accurate

News of the Industry

PAGE 422

VOLUME 60

Philadelphia, Saturday, March 9, 1929

NUMBER 10

Total February Production Fixed at 468,328 Vehicles

PHILADELPHIA, March 9—Keeping a close watch on the trend of retail sales throughout the country, automobile manufacturers foresee a market for new vehicles during the spring and early summer months that will more than tax production of the factories during that period. In consequence factories have entered March on increased schedules with a view to having dealers amply prepared to meet a heavy demand considered certain to accompany the advent of warmer weather.

The forecast made in *Automotive Industries* last week that a new all-time February production record would be set this year is borne out in the announcement of the National Automobile Chamber of Commerce meeting in Detroit Thursday to effect that its members produced a total of 342,344 vehicles during the month. Adding the output of the Ford Motor Co., 125,984, a total of 468,328 cars and trucks is revealed.

In keeping with the usual seasonal production trend in past years, several companies have reported gains in February output over January of from 5 to 76 per cent. The outstanding exception in this connection is the Ford Motor Co. which turned out 6094 cars and trucks less in February than in January. This decrease, ascribed to the three fewer working days in the later month, indicates that the Ford plant has been working at capacity. Chevrolet Motor Co., on the other hand, exceeded its January figure by 35,068 units in February and passed its former February record of 116,943 in 1926 by 4303 units. (See page 428)

Mail Plane Gains Speed

WASHINGTON, March 7—A Pitcairn mail plane, equipped with the new cowling for radial, air-cooled motors, recently developed by the National Advisory Committee for Aeronautics, increased its speed from 128 to 144 m.p.h. in a test flight this week, the committee announced.

U. S. Rubber Receipts Drop

NEW YORK, March 8—U. S. Rubber Company reports net income from operations for 1928 as \$4,257,049. After adjustment of inventories to meet reduced price of crude rubber the company reports net loss for the year of \$10,781,255.

Risley Forms Company to Make Accessories

PHILADELPHIA, March 7—Capt. D. Risley, Jr., who recently resigned as general manager of the Craveroller Co., has organized Risley, Inc., a company to manufacture automotive accessories and specialties. Clum Mfg. Co. of Milwaukee, will handle the products of the company for distribution.

Risley, Inc., will center its entire sales effort on the car manufacturer's service and accessory department. Temporary headquarters of the company are at Haverford, Pa.

A.C.C. Values Planes, Engines, at \$75,000,000

NEW YORK, March 7—Commercial aircraft production in 1928 was 140 per cent greater than in 1927, according to Aircraft Year book figures released today by the Aeronautical Chamber of Commerce, which shows that approximately 5000 airplanes and 3500 aircraft engines with a valuation in excess of \$75,000,000 were built in the United States during the last year. Of the airplanes, 3781 were commercial while 1219 were military, while 2087 engines built were commercial and 1413 military.

"The retail market value of commercial planes and motors built in 1928," the statement says, "was in excess of \$27,000,000."

Durant Office Moves

LEASIDE, ONT., March 6—With the office staff of Durant Motors of Canada, Ltd., installed in the new administration building of the company here, the former office have been turned over to the production and service departments.

Smallest Airplane Under Construction

BERLIN, March 4—What is said to be the smallest airplane in the world is under construction at the Phoenix Airplane Works in Duesseldorf. It weighs only 550 lb., is fitted with a 34 hp. Skion engine, permitting an average speed of 80 m.p.h., and will carry two passengers. The plane is 25 ft. wide, can be demounted quickly and requires only a small garage for a hangar. Carrying fuel for a five-hour flight, its radius will be 400 miles.

Firestone Steel Products Will Produce Batteries

AKRON, March 7—Firestone Steel Products Co. has announced definitely it will manufacture storage batteries to be merchandised by Firestone dealers. While the new venture is still in the formative stage, it is probable that the batteries will be on the market by autumn. No manufacturing equipment has been set up for battery making, but the engineering department is working on the design and a sales department is being organized.

Detroit Alloy Making New Tool Steel Line

DETROIT, March 6—"Dasco" steel is the trade name of a new line of alloy tool steels now being introduced to the national market and particularly to the automotive industry by the Detroit Alloy Steel Co., recently organized. Officers of the new company are Hugh Martin, president, who is also president of the Detroit Gray Iron Foundry Co.; Louis W. Schimmel, vice-president, and Harry H. Wyatt, secretary and treasurer.

Autocar Reports Earnings

PHILADELPHIA, March 6—The Autocar Co., truck manufacturer, reports net profit from operations, including sales and service subsidiaries, in 1928 as \$10.10 per share on common stock after preferred dividends.

Manufacturers Urge Holding Truck Week

N.A.C.C. Members Propose National Demonstration Instead of Vehicle Show

DETROIT, March 6—The 27 truck manufacturers attending the truck session, National Automobile Chamber of Commerce, here today voted unanimously that instead of a commercial vehicle show, limited to one territory, the N.A.C.C. should consider the advisability of sponsoring a Commercial Vehicle Week for the entire country, providing demonstrations and open-house programs in various truck showrooms. A committee is to be appointed to consider the proposal.

The effect of high gasoline taxes on the use of commercial vehicles was the subject of considerable discussion at the truck session. Straight rating of trucks whereby such vehicles would be designated by adding chassis weight, body weight plus load, also was discussed. It was announced that the Used Truck Book would be issued within 30 days. Martin L. Pulcher, president, Federal Motor Truck Co., presided at the session.

Five traffic managers of automobile manufacturers decided to attend the hearing before the Interstate Commerce Commission in Washington, April 10, at which revenue tests are to be submitted by railroads in connection with the general revision of all class rates in territory east of Chicago. Rates in classes where most automotive material is grouped would be increased generally under all of the proposals made thus far. J. S. Marvin was chairman of the conference.

Sloan, on Eve of Voyage, Predicts Good Quarter

NEW YORK, March 5—Alfred P. Sloan, Jr., president, General Motors Corp., sailed last week for a month's visit among operatives in England and Europe. Before leaving Mr. Sloan said that earnings for the first quarter will make a favorable showing, although it was impossible to make an actual estimate. The General Motors president was accompanied by Fred J. Fisher, vice-president, and J. D. Mooney, president, General Motors Export Co.

Mr. Sloan previously issued a statement to the effect that General Motors dealers delivered to customers in January 104,488 cars, as compared with 107,278 in the corresponding month last year. Sales this year were influenced by scarcity of cars in the field, particularly in Chevrolet, Pontiac and Oldsmobile lines, following the change in models in December.

M. & E. A. Book Out

NEW YORK, March 9—The Motor and Equipment Association has pub-

lished a buyer's guide to aircraft products listing several hundred such items manufactured by its members and the main and branch stores of its wholesale members. This list includes parts and accessories for original equipment and replacement, production equipment, service equipment, service supplies and special airport equipment for lighting and other purposes. A large majority of the 500 wholesale members of the M. & E. A. are listed as makers of these products.

Studebaker Announces New Commander Model

DETROIT, March 4—A new Commander model at a new low price was announced by A. R. Erskine, president of Studebaker Corp. Four new coupes are going into production this month, the lowest being listed at \$1,350. The previous low price in the Commander line was \$1,375.

The new cars are the Six business coupe at \$1,350; a Six sport coupe for four at \$1,425; an Eight business coupe at \$1,495, and an Eight sport coupe for four at \$1,550. Addition of these cars brings the total of specialty models for the Studebaker-Erskine line to 25, including six cabriolets, four victorias, four coupes, four roadsters and seven broughams.

DETROIT, March 6—Transfer of all Erskine assembly operations from Detroit to the Studebaker factories in South Bend has been completed and the newly established assembly line is speeding up to normal daily production, according to Mr. Erskine.

Russell Sets New Mark

TORONTO, March 7—Russell Motor Car Co., Ltd., of this city, reports net gain for 1928 as \$139,054, compared with \$123,274 in 1927. The constituent companies of Russell Motor Car include: Willys-Overland, Ltd., Canadian Acme Screw and Gear, Ltd., and Canadian Cycle and Motor Co., Ltd. More than 20,000 cars were shipped from the plant here last year, a record in the company's history.

To Offer Ainsworth Stock

CHICAGO, March 5—Offering of 66,667 shares of common stock in the Ainsworth Mfg. Corp., which is being organized under the laws of Michigan to acquire the Ainsworth Mfg. Co., Detroit, maker of windshields, garnish moldings, rolled shapes, foot rails, stampings and machined products, is to be made shortly by Lage & Co., and by Howe, Snow & Co., Inc., it is announced.

Suit Reported Settled

DETROIT, March 7—It was reported here today that the litigation brought by Wire Wheel Corp. of America against Budd Wheel Co., Willys-Overland, Inc., and Ford Motor Co. has been virtually settled.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES.

NEW YORK, March 7—Retail trade in the country districts has suffered somewhat from rain and snow storms, but there has been a general increase in orders in the jobbing trades for spring deliveries, especially in the cotton and silk trade.

COAL PRODUCTION

The production of bituminous coal during the week ended Feb. 16 amounted to 11,954,000 tons, which represents an increase of 2,580,000 tons over production in the corresponding week last year.

FREIGHT CAR LOADINGS

Car loadings for the week ended Feb. 16 totaled 958,051 cars, which marks an increase of 69,465 cars over those in the corresponding week last year and an increase of 3257 cars over those in the similar week in 1927.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended March 2 was 98.4, which compares with 98.0 the week before and 97.6 two weeks before and marks a new high for the year.

BANK DEBITS

Bank debits to individual accounts outside of New York City for the week ended Feb. 27 were 1 per cent above those in the corresponding week last year.

STOCK MARKET

Last week the Stock Exchange opened with a sharp advance in United States Steel, which had a stimulating effect on the entire list. The market became more buoyant with the approach of the inauguration of President Hoover. The week was marked by a general revival of speculation, with heavy public participation. Call money at times reached as high as 10 per cent. Brokers' loans for the four weeks ended Feb. 27 showed a decrease of about \$50,000,000, and on that date stood at about \$5,509,000,000.

FEDERAL RESERVE REPORT

The consolidated statement of the Federal Reserve banks for the week ended Feb. 27 indicated that attempts of the reserve authorities to contract credit are being continued. There were decreases of \$21,600,000 in holdings of bills bought in the open market and of \$6,200,000 in holdings of Government securities. On the other hand, there were increases of \$87,500,000 in holdings of discounted bills and of \$48,600,000 in member bank reserve deposits.

On March 2 the Federal Reserve Bank of Dallas raised its rediscount rate from 4½ per cent to 5 per cent. This is the first change in the rediscount rate of any of the Reserve banks since August 1, 1928.

Men of the Industry and What They Are Doing

Billings & Spencer Co. Holds Annual Election

The officers and directors of The Billings & Spencer Co. were elected at the annual meeting as follows: F. C. Billings, president and treasurer; A. H. Deute, vice-president and general manager; C. T. Jones, secretary; D. J. Post, chairman of the board of directors. The following comprise the directors: Messrs. Billings, Deute, D. J. Post, S. Hadfield, L. E. Zacher, E. Milligan, L. Robinson, N. Smith, and R. H. Goodman.

C. V. Fauver, for several years associated with the company as a cash accountant, was elected to fill the newly created position of comptroller. Mr. Deute speaking of the company's situation said: "Business conditions with the company are the best they have been in a long time. January sales for this year were higher than a year ago and the sales this month have already passed the first month's total."

Taft-Peirce Elects Blackall

Taft-Peirce Mfg. Co., Woonsocket, R. I., maker of special machinery and small tools, elected Frederick S. Blackall, Jr., vice-president and general manager at its recent annual meeting of stockholders and directors. In his new position Mr. Blackall succeeds his father who died last October. For the past four months he has acted as general manager by appointment of the board.

Bastien Leaves Stutz

P. C. Bastien has severed his connection as chief engineer, Stutz Motor Car Co. of America, Inc., and has announced that he will become connected with General Motors, Oldsmobile division.

Brady Leaves U. S. Rubber

Nicholas F. Brady, New York financier, has resigned as a director of the United States Rubber Co. Because the board had hoped to persuade him to remain, it was explained, no one was elected to fill his place.

Hudson in East

Dick Hudson, manager of the sales export division, Reo Motor Car Co., is making a trip in the East. He included Washington, D. C., in his itinerary in order to attend the inauguration of President Hoover, as guest of his father, Congressman Grant M. Hudson.

Chain Belt Promotes Shilbauer

R. A. Shilbauer has been promoted to the position of advertising manager, Chain Belt Co., Milwaukee, succeeding A. R. Abelt, who will devote his entire time to his position as sales manager of the chain and transmission di-



Crowley
Stokes
Photo

E. T. Causer

Formerly president, Atlas Mfg. Co., and works manager, Chandler Motors Corp., who was appointed general manager, crankshaft division, Union Drawn Steel Co., recently

vision of the company. Mr. Shilbauer has been assistant advertising manager of Chain Belt for several years, having joined the company in 1920.

Burke Made General Manager

H. E. Burke has resigned his position as purchasing agent and supervisor of planning and stock for Relay Motors Corp., Lima, Ohio, to become general manager of the Universal Machine Co., Bowling Green, Ohio, maker of automotive universal joints, radius rods and drag links.

Rickenbacker Medal Approved

The House of Representatives has passed the Clancy bill awarding a Congressional Medal of Honor to Captain E. V. Rickenbacker, assistant sales manager of the Cadillac Motor Car Co., who shot down 25 German aircraft while serving in the flying corps of the U. S. Army during the World War.

Diebold to Sell for Acme

National Acme Co., Cleveland, announces that Charles E. Diebold, formerly tool and machine supervisor in its shock absorber division, has been appointed a sales engineer, specializing on Acme and Gridley automatic products.

Reo Appoints Jackson

DETROIT, March 2—Oscar Jackson of Lansing has been appointed advertising manager of the Reo Motor Car Co., succeeding Henry T. DeHart, who has resigned.

Pierce-Arrow Appoints Strattan and O'Rourke

Pierce-Arrow Motor Co. has announced the appointment of Frank S. Strattan, formerly in charge of industrial development for the company, as assistant general sales manager in addition to the recent appointment of D. J. Willoughby as general sales manager.

Thomas J. O'Rourke, for several years passenger car sales manager of the company, has been appointed assistant to A. J. Chanter, first vice-president and general manager.

Schory Joins Hamilton Aero

Carl F. Schory, secretary of the contest committee of the National Aeronautic Association, Washington, D. C., has resigned to become associated in an executive capacity with the Hamilton Aero Mfg. Co., Milwaukee, recently merged with the United Aircraft & Transport Co., New York.

Chrysler Promotes Cooney

A. E. Cooney, general manager of the Dodge Brothers truck plant at Evansville, Ind., has been promoted to plant manager of three Chrysler-Dodge units, at Detroit, Stockton, Cal., and Evansville. Mr. Cooney will be succeeded as resident plant manager at Evansville by D. M. Snyder, Detroit.

Acklin Stamping Names Voss

Walter C. Voss has been appointed Detroit sales manager, Acklin Stamping Co., to succeed Harold Jay, who has left the company to take a position with the Edward Ford Glass Co.

Harris Joins Erie Malleable

The Automotive Wheel Division, Erie Malleable Iron Works, has announced the appointment of Ernest W. Harris as executive engineer, effective March 1, Mr. Harris recently resigned as chief engineer, Eaton Axle & Spring Co.

Ruark Returns From Coast

NEW YORK, March 4—B. W. Ruark, assistant manager of the Motor & Equipment Association, has just returned to Chicago from an extensive trip calling on members on the Pacific Coast.

Barnard & Leas Names Weigel

A. R. Weigel, for the last five years factory manager for the Velie Motors Corp., has joined Barnard & Leas Mfg. Co. as general manager of the factory.

McAleer Names Snively

DETROIT, March 2—Vaughan J. Snively has been made assistant general sales manager of the C. H. McAleer Mfg. Co., maker of lacquer polish.

McKinnon is Fourth G.M. Canadian Unit

New Plant, With Changes in Personnel, to be Division

ST. CATHERINES, ONT., March 4—In acquiring McKinnon Industries, Ltd., of this city, General Motors Co. of Canada, Ltd., brings the total of its manufacturing plants in Canada to four. Completion of the transaction, on the basis of an exchange of four McKinnon shares for three in General Motors, was announced in a statement by R. S. McLaughlin, president of the latter company, to the effect that 93 per cent of McKinnon stock had been deposited. Mr. McLaughlin has become chairman of the board of the McKinnon company which is to be operated as a division of General Motors.

The president of the new McKinnon organization is H. J. Carmichael, who for the past two years was general manager. He succeeds B. W. Burtzell, who has retired. The new vice-president is H. A. Brown, vice-president and general manager of General Motors Co. of Canada, Ltd. F. L. Pattison continues as secretary. The treasurer is E. T. Papworth, formerly comptroller, Brown-Lipe-Chapin division of General Motors. The directors include: E. F. Johnson, executive in charge of the accessories divisions of General Motors; C. E. Wilson, assistant to Alfred P. Sloan, Jr., and H. M. Hogan, a member of the legal department of General Motors.

Timken Earnings Are \$13,730,145

CANTON, March 4—With an expenditure of more than \$8,300,000 for new buildings and equipment, opening of a sales office in Canada, organization of manufacturing units in France and Germany and a net profit for 1928 of \$13,730,145, the Timken Roller Bearing Co. has completed one of the most successful years since it began operation, according to the annual report to stockholders prepared by H. H. Timken, president.

Of the profits \$6,304,630 will be paid out in cash dividends and the remaining \$7,836,057 transferred to the surplus account. The building and expansion program this year will be continued to the extent of approximately \$4,500,000, in order to provide adequate capacity for the increased demands of Timken bearings.

An unprecedented increase in sales of bearings for use in automobiles last year was attributed largely to Timken bearings having supplanted other types in many makes of cars. According to the report 35 of the 40 principal manufacturers of automobiles now use the company's product.

Financial Notes

Hoskins Mfg. Co. reports net profit for 1928 after all charges, including Federal taxes, as \$471,114.18, equivalent to \$4.90 per share as compared with \$3.61 for 1927, representing an increase in earnings of 35 per cent.

McQuay-Norris Mfg. Co. reports net income for 1928, after all charges and provision for taxes, as \$626,475 as compared with \$315,352 in 1927, an increase of nearly 100 per cent. Working capital was increased during the year by \$256,644, bringing it to \$1,581,073.

American-LaFrance and Foamite Corp. shows net profit for 1928 as \$412,803. The statement does not include commercial truck business of the organization. Sales for the year were reported as \$477,678 greater than in 1927.

Federal Motor Truck Co. reports 1928 net profits after charges and Federal taxes of \$550,588, equivalent to \$1.10 per share on 499,543 shares of no par value capital stock. This compares with 1927 net profit of \$447,556, or 99 cents a share, on 452,562 shares then outstanding.

Borg-Warner Corp. has declared regular quarterly dividend of \$1 on common and \$1.75 on preferred stocks and a stock dividend of 2 per cent, all payable April 1 to holders of record March 20.

C. M. Hall Lamp Co. announces its capital stock has been placed on \$1.50 annual dividend basis, compared with \$1 previously, through declaration of a quarterly dividend of 37½ cents payable March 15 to stock of record March 1.

Doehler Die Casting Co. reports net profits after all charges for 1928 as \$608,380, the largest ever earned in the history of the company. This is equivalent to \$3.19 a share and compares with earnings of \$389,577, or \$1.98 a share, in 1927.

Marlin-Rockwell Corp. and subsidiaries report net profit for 1928 after all charges as \$2,511,897. This is equivalent to \$6.94 a share on stock outstanding at the end of the year and compares with \$961,086, or \$2.70 a share, on stock outstanding at the end of 1927.

Johns-Manville Corp. has declared quarterly dividend of \$1.75 on preferred and 75 cents on common stocks, both payable April 1 to holders of record March 11.

Rolls-Royce, Ltd., has declared an annual dividend of 8 per cent and an extra dividend of 2 per cent.

Parker Rust-Proof Co. reports net profits for 1928 as \$320,290, after charges including taxes and depreciation. This is an increase of \$224,550 over 1927 net profits, which were \$95,840.

Mack Trucks, Inc., and subsidiaries report net profit for 1928 after all charges as \$5,915,301. This is equivalent to \$7.83 a share and compares with \$5,844,306, or \$6.60 a share, for 1927. Net income for the fourth quarter of 1928 was \$1,462,855, or \$1.94 a share, and compared with \$740,715, or 64 cents a share, for the fourth quarter of

1927. Total sales for the year were \$55,850,860 and compared with sales in 1927 of \$55,270,294.

Century Rotary Motor Corp. is offering an issue of 58,892 shares of its total authorized 100,000 shares of \$10 par common stock. This company has a plant at Canastota, N. Y., equipped to produce about 300 airplane motors a year with ground for expansion for larger capacity.

Worthington Pump & Machinery Corp. and subsidiaries report net income for 1928 after all charges as \$974,076. This compares with \$600,343 for 1927 and is equivalent to \$6.12 a share on combined Class A and Class B preferred stocks as compared with \$3.77 a share for the previous year.

Commercial Credit Co. has increased its quarterly dividend on common to 50 cents from 25 cents a share. Net income applicable to common for 1928 was \$4,132,391, equivalent to \$4.01 a share, as compared with \$2,067,888 in 1927. Additional dividends declared by directors are: \$1.62½ on the 6½ per cent first preferred; 44½ cents on 7 per cent first preferred, and 50 cents on Class B-8 per cent preferred, all payable March 30 to stockholders of record March 9.

Chandler-Cleveland Motors Corp. showed a loss for 1928 of \$400,305 after all charges. This compares with net loss of \$473,109 the preceding year.

Electric Auto-Lite Co. reports net earnings for 1928 after all charges as \$7,778,818, or \$8.41 a share, on outstanding no par common stock. This compares with \$2,363,475, or \$9.48 a share, on common stock outstanding at the end of 1927.

Spicer Mfg. Co. and subsidiaries report net profit for 1928 of \$2,609,533. This is equivalent after preferred dividends to \$7.12 a share on outstanding common stock and compares with net earnings for 1927 of \$1,116,352, or \$2.94 a share, on common stock then outstanding.

B. F. Goodrich Co. reports net profit for 1928 after all charges as \$3,513,023. This is equivalent after preferred dividends to \$1.50 a share on common stock and compares with profits of \$11,780,306, or \$15.44 a share, on common stock outstanding at the close of 1927.

Miller Rubber Co. reports net operating profit of \$612,324 for 1928 but a deficit of \$2,092,329 after crude rubber losses.

Durant Motor Co. of California reports net profit for 1928, after taxes and charges, as \$624,544, equal to \$2.12 a share on 294,600 shares of common. Gross sales were about \$12,000,000.

Bohn Aluminum & Brass Co. has declared an extra dividend of 50 cents on common and the regular quarterly dividend of 75 cents, both payable April 1, to stock of record March 15.

Reo Motor Car Co. has declared an extra dividend of 20 cents in addition to the regular quarterly payment of 20 cents, both payable April 1 to stock of record March 11.

Bendix, Keith, Hoyt Buy Into Stromberg

Stiger Resigns and Sells Holdings; New Directors are Elected

CHICAGO, March 7—Purchase of a substantial interest in the Stromberg Carburetor Co. of America by Vincent Bendix, president of the Bendix Corp., was announced here today following a meeting in New York yesterday. Changes in the organization of the company were also announced. Charles W. Stiger, of Chicago, president of the Stromberg company since its organization, announced his retirement and the disposal of his holdings. At the same time Charles A. Brown and W. W. Wheelock, of Chicago, resigned from the board. They were succeeded by C. M. Keys, head of the Curtiss Airplane & Motor Co., and Richard F. Hoyt, of New York, chairman of the board of Wright Aeronautical Corp.

William L. O'Neill, former vice-president of the Stromberg company, was named president. It was not announced whether the Bendix-Keith-Hoyt holdings were sufficient to guarantee control of the company. At the same meeting the directors of the company voted an initial quarterly dividend of 75 cents a share on capital stock, placing it on a \$3 annual basis. The stock was formerly on a \$6 basis before payment in January of an 87½ per cent stock dividend.

Canada Shows Increase in Automotive Exports

WASHINGTON, March 7—Automotive exports from Canada during 1928 amounted to \$36,028,481, a substantial increase over the years 1927 and 1926, when exports totaled \$28,428,997 and \$32,736,901 respectively, according to a statement issued this week by the U. S. Department of Commerce.

According to the statement, 242,382 motor vehicles were produced in Canada last year as compared with 179,054 the preceding year. Of the total number produced, 79,388, or 33 per cent, were exported, leaving 67 per cent for domestic consumption. Australia furnished the best market for Canadian cars, taking 11,220 of the total number produced. The average value of cars exported was \$452, and of trucks \$365.

Fisk Proposes New Stock

NEW YORK, March 5—Fisk Rubber Co. has called a meeting of its stockholders for March 27 to approve an offering of additional common stock at \$11 a share to stockholders of record March 15 in the ratio of one new share for every share held. The proposal calls for an increase in authorized common shares from 1,250,000 to either 2,000,000 or 2,200,000 shares no par

Propose Museum of Engineering

WASHINGTON, March 7—A bill proposing the establishment of a National Museum of Engineering and Industry, in which would be housed the Government's collection of machinery and other materials indicative of the United States' industrial and engineering development, was introduced in the Senate by Senator Copeland of New York, shortly before adjournment of the Seventieth Congress.

value. The exact amount of new stock is to be determined at the stockholders' meeting.

Graham-Paige Plant Grows

EVANSVILLE, IND., March 4—The Graham-Paige body plant here has added the roadster to its regular schedule of touring and four-door sedan bodies, according to R. E. Stone, secretary and production manager. Production has been advanced to more than 100 bodies a day, and the number of persons on the payroll exceeds 1100.

Reo Expands Abroad

DETROIT, March 6—The Reo Motor Car Co. has established two new units in its foreign sales organization. A wholesale distributing branch has been opened in Brussels, Belgium, and another in London, England. W. D. Cairns, who has been associated with Reo Motor Car Co. in England for some time, is assigned to the London branch, and M. A. Waldo, who joined Reo several years ago, takes charge of the Belgian branch.

Fire Sweeps Car Show

LOS ANGELES, March 6—A fire which swept the automobile show here yesterday caused damage estimated at \$2,000,000, destroying more than 300 automobiles and several airplanes, trucks and motorboats.

Nash Earnings High

KENOSHA, WIS., March 5—Nash Motors Co. reports net earnings for 1928 as approximately \$4,000,000, which compares with \$2,604,378 for the previous year. Exact figures are not yet available as the fiscal year ended Feb. 28.

Coliseum to Have Exhibit

CHICAGO, March 7—United Aeronautical Society announces that it has leased the Coliseum and adjoining halls for the International Aircraft Exhibit, Sept. 7-15.

Velie Motors Sells Automotive Section

New Illinois Corporation to Occupy Plants Until Estate is Liquidated

CHICAGO, March 6—Sale of the automotive division of the Velie Motors Corp. was announced today in Moline by W. L. Velie, Jr. The purchaser is the Indianapolis Machinery & Supply Co., which has been incorporated in Illinois as the Velie Auto Parts & Service Co., to operate the business. M. Feinberg is president of the latter company and E. Letzer is vice-president. James Westphal of Moline has been named general manager.

The Velie Auto Parts & Service Co. will continue to occupy the Velie plants until the plants and the machinery belonging to the Velie estate are liquidated.

"The Velie interests will continue to operate Mono Aircraft, Inc.," said Mr. Velie today, "but we shall liquidate all other divisions of the business."

Founder of Buick Dies; Last Years Were Obscure

DETROIT, March 5—David Buick, 72 years old, one of the original founders of the Buick Motor Co., died here today, following a month's illness. In the early days of the automobile industry, Buick was a plumbing supply manufacturer in Detroit. He sold his business and devoted the proceeds to experimental work with automobiles. The Buick company was formed in association with Flint capitalists, but the founder's connection with it was brief.

Fisher Promotes Mauck

DETROIT, March 4—Pierre J. Mauck, for six and a half years superintendent of production at the Cleveland plant of the Fisher Body Corporation, has been promoted to the position of manufacturing engineer for the 40 Fisher plants in the United States and Canada. He will have headquarters at the general offices in Detroit.

Hayes Elects Directors

DETROIT, March 5—H. A. Fisher and R. O. Gill of Detroit and K. W. Todd of Pittsburgh, have been elected directors of the Hayes Body Corporation to represent eastern interests which have acquired substantial holdings in the company.

Lefere Forge Organized

DETROIT, March 6—Lefere Forge Machine Co. of Lansing, has been organized by Alidor Lefere, who becomes president and general manager. The company plans to erect a five-unit forge plant in Lansing. Mr. Lefere was one of the organizers of the Riverside Forge and Machine Co., of Jackson.

Exports, Imports and Reimports of the Automotive Industry for January, 1929, and Total for Six Months Ending December, 1928

	Month of January		Six months ending December	
	1928	1929	1927	1928
	Number	Value	Number	Value
Automobiles, parts and accessories.....	...	\$31,046,772	...	\$176,442,072
Electric trucks and passenger cars.....	27	42,639	58	126,905
Motor trucks and buses, except electric (total)	11,584	7,622,066	50,699	35,561,416
Up to 1 ton, inclusive.....	9,811	4,963,669	39,948	19,805,968
Over 1 and up to 2½ tons.....	1,525	1,780,162	9,634	12,459,464
Over 2½ tons.....	248	878,235	1,117	3,295,984
PASSENGER CARS				
Passenger cars, except electric (total).....	20,476	15,673,778	118,967	90,809,511
Value up to \$500, inclusive.....	...	...	22,096	8,176,296
Value over \$500 up to \$800.....	...	...	35,838	18,677,921
Value over \$800 up to \$1,200.....	...	...	40,626	33,623,323
Value over \$1,200 up to \$2,000.....	...	...	15,871	19,567,695
Value over \$2,000.....	...	...	4,536	10,764,276
PARTS, ETC.				
Parts, except engines and tires.....	...	2,641,412	...	15,142,246
Automobile unit assemblies.....	...	3,637,104	...	27,563,208
Automobile parts for replacement.....	...	684,810	...	3,483,013
Automobile accessories.....	...	359,323	...	2,743,209
Automobile service appliances (n. e. s.).....	...	...	...	...
Station and warehouse motor trucks.....	...	...	...	...
Trailers.....	55	20,390	463	217,827
Airplanes, seaplanes and other aircraft.....	32	310,752	44	536,958
Parts of airplanes and accessories, except engines and tires.....	...	25,457	...	380,939
BICYCLES, ETC.				
Bicycles and tricycles.....	709	18,711	2,622	65,373
Motorcycles.....	1,482	364,372	8,380	1,897,290
Parts, except tires.....	...	107,513	...	622,911
INTERNAL COMBUSTION ENGINES				
Stationary and Portable	25	83,231	129	287,269
Diesel and Semi-Diesel.....	...	...	...	...
Other stationary and portable:				
Not over 10 H.P.....	3,378	273,668	15,229	1,404,478
Over 10 H.P.....	104	73,152	1,960	852,051
Automobile engines for:				
Motor trucks and buses.....	887	89,764	2,015	281,907
Passenger cars.....	5,661	655,199	25,723	3,473,866
Tractors.....	62	21,711	474	128,999
Aircraft.....	4	4,125	61	361,183
Accessories and parts—carburetors.....	...	255,509	...	1,226,799
IMPORTS				
Automobiles and chassis (dutiable).....	29	61,205	354	670,930
Other vehicles and parts for them (dutiable)	...	17,861	...	164,918
REIMPORTS				
Automobiles (free from duty).....	28	27,562	85	135,201

Consumed 378,629 Tons
of Tire Rubber in 1928

NEW YORK, March 4—Crude rubber consumed in the manufacture of tires and tire sundries in the United States during 1928 amounted to 378,629 long tons, according to the statistical bulletin of the Rubber Association of America, Inc. This consumption is out of a total of 442,227 long tons consumed in the United States during the year.

Estimated total sales value of shipments of tires and tire sundries during the year was \$838,115,217 out of a total for all rubber products of \$1,195,423,900. Estimated stocks of crude rubber on hand in the United States as of Dec. 31 were 67,232 long tons, with the estimated amount afloat bound for the United States on that date as 74,391 tons.

Output to be 25 Tons Rubber

AKRON, March 6—The \$1,000,000 rubber reclaiming plant which the Goodyear Tire & Rubber Co. is to erect at Gadsen, Ala., this summer will be 380 ft. by 100 ft. and will adjoin the huge tire factory of the corporation now under construction, according to company officials. Its capacity is scheduled at 25 tons of reclaimed rubber a day.

New Jack Plant Opens

MOLINE, March 6—Moline Hydraulic Jack Co., a \$500,000 corporation recently organized, has started production of its new hydraulic jack for automobiles, special jacks for factories and lifting machinery and other equipment,

in the former Reynolds Engineering Co., plant here. A force of 50 will be employed during the summer and officials anticipate early necessity of erecting a larger plant. A. E. Montgomery, president of the Montgomery Elevator Co., is president of the company; T. C. Pomeroy, inventor of the jack, vice-president, and D. Lambert Esterdahl, secretary-treasurer.

Packard Reduces Prices

DETROIT, March 4—Packard Motor Car Co. today announced price reductions of \$160 on all models of the Standard Eight. New prices follow:

126-in. Wheelbase	
5-Pass. Sedan	\$2,275
2- " Coupe	2,350
2- " Convertible Coupe	2,425

133-in. Wheelbase	
2-Pass. Runabout	\$2,375
5- " Phaeton	2,375
7- " Touring	2,475
4- " Coupe	2,575
5- " Club Sedan	2,575
7- " Sedan	2,575
7- " Sedan-Limousine	2,675

Stout Praises U. S. Planes

NEW YORK, March 6—"The general belief that European developments in air transportation are ahead of those in America is a fallacy," declared William B. Stout, head of the airplane division, Ford Motor Co., upon his return from a study of air lines in Europe. "American engineers," he added, "have produced planes and engines which set the standard abroad."

Federal-Mogul Acquires
National Sale of Shims

DETROIT, March 5—A joint announcement by Bradford Darrach, Jr., general manager, Laminated Shim Co., Long Island City, N. Y., and by D. W. Rodger, sales director, Federal-Mogul Corp., of this city, says that the national sale of Laminum shims to the replacement trade will be handled hereafter by Federal-Mogul, as an addition to its line of bearings, bushings, washers, castings and other products.

Federal-Mogul Corp. recently announced net profit of \$455,963 for 1928, after all charges and provision for Federal taxes, amounting to more than \$3.50 a share on 130,000 shares of no par common stock outstanding. J. H. Muzzy, chairman of the board, announced that an addition to the plant is under construction which should permit substantial savings from more efficient operations.

The corporation has established a die-casting division for handling contract manufacture of die-cast parts. This new division eventually will be housed in the 25,000 sq. ft. addition that is being made to the Detroit plant.

Producing New Heater

STOUGHTON, WIS., March 4—An electrically operated device for warming automobile engines in cold weather has been placed in production at the plant of the Stoughton Mfg. Corp., for the McGraw Electric Co., Omaha. The device is the invention of A. J. Cole, of the McGraw engineering staff.

Locomobile Rumor Denied by Freed

Plant Will Not Stop Manufacturing Passenger Cars, He Says

BRIDGEPORT, CONN., March 6—Activities centering around the Locomobile plant in this city have led to repeated rumors that the Locomobile Co. of America is going out of business. These rumors, however, have been denied by A. S. Freed, who has been active in the plant. Mr. Freed is understood to be representing Durant's interests and appears to be in charge of operations at present, although little information can be obtained.

It is believed that the Locomobile line is being completely redesigned and that the new line will have a number of models covering a comparatively wide price range. It is also reported that the company itself is undergoing reorganization but details as to personnel changes, changes in capital structure, if any, and other phases are at present unavailable and may not be worked out for some months.

Another rumor which has been in circulation ever since Durant acquired a substantial interest in Paramount Cab Mfg. Co., namely, that Paramount Cab was to be manufactured at the Locomobile plant, has been definitely denied by Mr. Freed.

Davis Will Start Output of Two Makes in 90 Days

BALTIMORE, March 7—The George W. Davis Motor Car Co., now a division of the Automotive Corp. of America, will start production at its factory at Richmond, Ind., within 90 days, according to Villor P. Williams, general manager. Two makes of cars will be produced, the New York Six and the Davis Six and Eight.

Both makes, regardless of body type, will be equipped with the Parkmobile, a new automatic parking device consisting of power-driven rollers, permitting the car to move sidewise and facilitating parking in crowded quarters. Other divisions of the Automotive Corp. of America are the Parkmobile Corp. and the New York Motors Corp.

Secretary Lamont Has Automotive Background

WASHINGTON, D. C., March 5—Men of the industry attending President Hoover's inauguration this week were of the general opinion that the appointment of Robert Patterson Lamont as Secretary of Commerce is particularly favorable because of his extensive industrial experience. Mr. Lamont was a director of Dodge Brothers Corp. previous to its acquisition by Chrysler. The new cabinet member has resigned

February Production and Shipments

Ford Motor Co. produced 125,984 cars and trucks, compared with 132,078 in January and reflecting a decrease ascribed to the three fewer working days in the later month.

Chevrolet Motor Co. achieved the greatest February in its history with a total production of 121,246 cars and trucks, compared with 86,178 in January. A tentative schedule calls for 140,000 units in March.

Cadillac Motor Car Co. reports that combined shipments of Cadillac and LaSalle cars exceeded any previous shipping record of the company. Sales of Fleetwood custom bodies increased 104 per cent over February, 1928.

Hudson Motor Car Co. established a record February with output and shipments of 36,842 Hudson and Essex cars, compared with 30,315 in February, 1928. The March schedule calls for 45,000 cars for shipment.

Peerless Motor Car Co. exceeded its best previous February record by more than 80 per cent. Shipments for the first two months of the year totaled 2590 cars.

Graham-Paige Motors Corp. reports the second largest month in its history with an output of 10,004 cars, showing a gain of 76 per cent over January, and compared with production of 4019 cars in February, 1928. A new one-day record was set Feb. 25 when 578 cars were turned out.

Franklin Automobile Co. broke all previous records for the month of February with shipments of 1300 cars, exceeding January shipments by 28 per cent.

Auburn Automobile Co. reports shipments as approximately 2600 cars, compared with 604 in February, 1928, bringing shipments in the first three months of its fiscal year to about 5300 cars, compared with 1634 in the same period a year ago. Feb. 25 was the largest day in the company's shipment record, when 158 cars left the plant.

Hupp Motor Car Corp. shipped 4161 cars compared with 3687 in January and 5214 in February, 1928.

Buick Motor Co. reports production as approximately 15,000 cars and has scheduled approximately 17,000 for March.

ed from the offices he held in various corporations. His industrial affiliations included the presidency of the American Steel Foundries and directorship in several corporations, among them the Globe Steel Tubes Co.

Wheel Firm Stock Sold

OMAHA, March 6—The entire stock of Motor Industries Corp., of Omaha, has been sold to G. F. Morgan, former secretary and treasurer. The name of the firm, which manufactures and sells wheels, rims and kindred parts, has been changed to Morgan Wheel & Rim Co.

Chrysler Motors shows estimated shipments totaling 48,000 passenger and commercial cars in all divisions. It is understood March schedules call for approximately 59,000 units, 11,000 of which are to be Plymouth, 8000 De Soto, 15,000 Chrysler and 25,000 Dodge Brothers.

Olds Motor Works report shipments as 10,109 compared with 7460 in January and 5208 in February, 1928. Output was 10,200 cars. The March schedule calls for 14,500 vehicles.

Packard Motor Car Co. shipped 4296 cars, compared with 4604 in January and 4409 in February, 1928. Production in February was 4396, compared with 4249 in February of last year.

Reo Motor Car Co. reports shipments of 3250 cars and Speedwagons, compared with 2350 in January and 2467 in February, 1928. Shipments for the year to date are approximately 20 per cent ahead of those in the same period last year.

Oakland Motor Car Co. produced 27,000 units, exclusive of Canadian output. Production is not up with retail orders and high output is to continue in March.

Studebaker Corp. of America reports shipments of Studebaker and Erskine cars as approximately 10,500, practically the same as in February, 1928, and compared with about 6500 shipped in January, 1929. A tentative March schedule calls for 16,000 passenger and commercial cars.

Willys-Overland, Inc., produced approximately 33,000 cars, compared with 32,000 in January and 22,500 in February, 1928. Output of about 65,000 cars for the first two months, 1929, compares with approximately 40,000 for corresponding period last year.

Nash Motors Co. shipped 12,076 cars, compared with 9057 in February, 1928. Shipments were 27,627 for the first quarter of the present fiscal year (beginning Dec. 1), as compared with 19,042 for the corresponding period a year ago.

Pierce-Arrow Motor Car Co. entered March with unfilled orders for about 2500 cars, of a retail value exceeding \$7,500,000, compared with 289 unfilled orders a year ago. Preparation is being made for a schedule of 75 cars daily.

Dallas Has New Plant

DALLAS, March 5—Weaver Springs and Bumper Works is the newest automotive manufacturing plant in Dallas. L. K. Weaver, president of the Standard Spring and Axle Co., is president of the new concern and B. M. Pierce is in charge of the plant.

Dates for 1930 Shows Set

DETROIT, March 7—The 1930 New York Show will begin on Jan. 4 and the 1930 Chicago Show will begin on Jan. 25, S. A. Miles announced here today.

Steel Mills Strive to Complete Orders

Advance of \$2 Per Ton in
Automobile Sheets is Con-
sidered Likely

NEW YORK, March 7—There is considerable discussion of a possible \$2 per ton advance in full-finished automobile sheets. When the mills recently quoted black and blue annealed sheets \$2 per ton higher, the fact that the price of full-finished automobile sheets was permitted to remain unchanged caused considerable comment. In some quarters it was said that finishing mills had so satisfactory a run of business that they did not care to jeopardize its continuity by any change in price.

Meanwhile, however, the price for metal furniture sheets has been advanced in keeping with that for black sheets, and it is now pointed out that an advance in one kind of highly finished sheets would have to be followed by the marking up of the price for the other. While the demand for all descriptions of sheets has broadened, competition for attractive orders for black and blue annealed continues strong. The market for hot and cold-rolled strip is firm, and the demand for fender stock, which is not affected by the new card of extras, continuing to be quoted at 4.35c for No. 20 gage, is heavy.

Sheet mills are striving to clean up all first-quarter contracts and some of the producers will not accept specifications against these after next week. The semi-finished market is generally considered to be on a \$1 per ton higher basis. Some of the finishing mills have contracts at old prices to carry them over the current quarter, but on new business \$35 is quoted on sheet bars and \$34 on billets and slabs. Automotive demand for bolts and nuts continues good. Automotive alloy steels move freely, with the market strong.

Pig Iron—Second-quarter demand has turned brisk. While the foundry market continues at \$20 for Michigan shipment and Valley furnaces are selling even single carloads at \$17.50, there is a decidedly stronger undertone in the malleable market, malleable foundries enjoying excellent automotive demand.

Aluminum—While the price for virgin metal remains unchanged, quotations for aluminum-copper alloys have been revised upward by some producers in keeping with the advance of the latter metal. Demand for aluminum from consumers usually buying copper, but who are gradually substituting aluminum because of the advance in the red metal is also on the uptrend. Under these conditions the market naturally rules strong.

Copper—With the copper market only a fraction below the 20 cents level, consuming demand has quieted down to some extent. Brass and copper products, including seamless tubes and nickel silver, have been marked up in keeping with the higher

Highway Advancing in South America

NEW YORK, March 7—The All-Americas Highway is being advanced rapidly in South America, according to information received by the Pan-American Union. The stretch covering the route from Valparaiso to Buenos Aires has been completed up to the Chilean side of the Andes to La Cumbre. This point marks the end of the Chilean highway and the beginning of the Argentine section. The Argentine section between La Cumbre and Mendoza down the eastern slope of the Andes is expected to be in usable condition within a few months.

price of the metal. The price of copper has now reached a level where sales resistance is beginning to become a factor to which producers are giving serious attention.

Tin—The market rules steady with price fluctuations of a minor character. Dealers are of the opinion that it will not be long before tin will advance.

Kinner Advances Output to Three Engines Daily

GLENDAL, CAL., March 4—Kinner Airplane & Motor Corp. has just received an order for 300 motors from the Alexander Industries of Colorado Springs, involving a sum of \$450,000, according to W. B. Kinner, president.

This order, in addition to the recent one for 300 engines from the American Eagle Aircraft Co., Kansas City, has caused the new Kinner factory here to advance production to three motors per day.

Studebaker to Operate Two Gotfredson Plants

OTTAWA, ONT., March 4—Following the financial collapse of the Gotfredson Corp., Ltd., truck manufacturers, two units of the Gotfredson plant at Walkerville, Ont., have been taken over by the Studebaker Corp. of Canada, according to the announcement of D. R. Grossman, vice-president and general manager of Canadian Studebaker. The staff of 110 men employed by Gotfredson at Walkerville is being retained. Operations will include the building of bodies for the Studebaker and Erskine lines, it is explained.

DETROIT, March 5—Bankruptcy proceedings have been brought against Gotfredson Truck Corp., of this city in friendly proceedings instigated in Federal Court for the eastern Michigan district by the Timken-Detroit Co. and Motor Products Corp., following action brought in Canada last week, when the parent organization, Gotfredson Truck Corp., Ltd., entered a receivership.

Sales in 18 Cities Are Nearly 31,000

January Business Exceeds
Volume Last Year by
53 Per Cent

PHILADELPHIA, March 5—January new car sales registration figures from 18 cities covering every section of the country except the far West bear out the assertion made before in these columns that 1929 started off in better shape than many preceding years. In the 18 cities mentioned, new car sales during January, 1929, were slightly over 20,000, while during January, 1928, they were nearly 31,000, or 53 per cent greater than the year before.

This remarkable increase was fairly well distributed throughout the list with the dealers in every city having sold more cars in last January than in the same month a year ago. In Louisville, Ky., 1929 sales exceeded those of 1928 during the opening month of the year by only eight per cent—the smallest gain made by any of the cities covered in this report. From this minimum figure, the gains of 1929 over 1928 ranged up to 88 per cent for Rochester, N. Y., and 89 per cent for Cleveland, Ohio.

Not only were January, 1929, sales greater than those of 1928, but in only two cities on the list—Cincinnati and Kansas City—were last January sales exceeded by those of 1927.

January Tractor Exports Are Valued at \$5,137,878

WASHINGTON, March 7—Exports of wheel tractors of 15 to 32 belt hp. from the United States more than tripled in value during January, compared with January, 1928, according to a report issued this week by the Department of Commerce. Of this type of tractor a total of 6018 valued at \$5,081,077 were exported, compared with 1782, valued at \$1,516,614, for the same month a year ago.

In tractors under 15 hp. a huge increase was caused, the department explains, because of the removal of a well known American tractor from the market. Exports of tractors of this type totaled only 74, valued at \$56,801, in January, 1929, as compared with 4233, valued at \$2,031,183, in January, 1928.

Unit Corp. to Expand

MILWAUKEE, March 5—Unit Corp. of America, manufacturer of transmissions and other steel automotive products, is negotiating for the acquisition of three concerns not in Wisconsin and expects to make definite announcement within a few weeks. The company reported net income for 1928 as \$484,504, compared with \$335,534 in 1927. Sales for the year totaled \$3,558,562 against \$2,623,757 in 1927.

Officials to Show Roosevelt Abroad

INDIANAPOLIS, March 6—Introduction of the Roosevelt at the International Automobile Show at Geneva, Switzerland, which opens March 14, is the first step in the program of foreign trade expansion launched by the Marmon Motor Car Co. G. M. Williams, president, and Frank L. Hambly, export manager of the company, took one of the new cars with them when they sailed for Europe March 1. The first Roosevelt manufactured by the company was previously shipped for display at the Geneva show.

On the eve of sailing Mr. Williams, in making known that he will study possibilities for developing the market for American automobiles in Russia, intimated that his company might erect a factory within Soviet boundaries. This is the twenty-sixth trip abroad for the Marmon president.

H. Granville Smith, newly appointed sales manager on the Continent for Marmon, has arranged for 12 new Marmon distributors in Germany. Following the show Mr. Williams and Mr. Hambly will take the Roosevelt to Germany.

Among new export representatives for the company are: J. A. Munos, Argentina, Chile, Peru, Brazil, Uruguay, and J. E. O'Brien, central and northern part of South America, Cuba, West Indies, Mexico and Porto Rico. W. W. Stillson recently sailed from San Francisco for a trip around the world introducing the new Roosevelt. He will meet Mr. Hambly at the Paris Automobile Show next October, after the latter has returned to America and made another trip abroad. H. A. Kingsley is to introduce the new car in Australia and New Zealand.

Air Associates to Build

NEW YORK, March 5—Air Associates, Inc., distributors of aircraft motors and parts and operators of service stations at a number of American airports, is to spend \$500,000 in equipment and plants to be erected at airports in New York, Chicago and Newark.

Airplane Engines Safer Than Pilots

WASHINGTON, March 5—Slightly more than 15 per cent of the 1062 airplane accidents which occurred in the United States last year were caused by powerplant failures, according to statistics published this week by the Department of Commerce. More than half of the accidents were caused by the pilot's use of poor judgment, employment of poor technique, disobedience of orders, carelessness or negligence and other causes due to the supervisory or other personnel, the report shows.

Companies Join to Have World's Largest Airport

NEW YORK, March 6—New York Air Terminals, Inc., has been organized by a number of prominent companies in the aviation field and has purchased a site of 743 acres at Secaucus, N. J., for the erection of what purposes to be the best equipped and largest airport in the world.

The company, in addition to its real estate holdings, has a working capital of \$3,000,000 subscribed by financial houses in New York. It is financed through the issue of 250,000 shares of common stock, all of which has been absorbed by the banking interests back of the company.

Hayden, Stone & Co. are the primary backers of the new corporation and have affiliated with them Curtiss Aeroplane & Motor Co., Wright Aeronautical Corp., National Air Transport, Transcontinental Air Transport and other aviation companies.

Fiat Prices Reduced

WASHINGTON, March 5—Price reductions on Fiat models 520 and 509, ranging from 700 to 1500 lire, went into effect recently, according to a dispatch received from Rome by the Department of Commerce.

Dayton Malleable Will Reopen Plant

CANTON, March 7—After being closed for two years, the plant of the Dayton Malleable Iron Works in this city will reopen within 30 days. Production will be resumed on a limited scale with prospect of ultimately employing 700 men, more than twice the number employed when the plant suspended operation. Accumulation of orders for its products, principally automobile axles, has prompted the reopening, and it is understood anticipated orders will cause expansion of plant personnel later.

The plant here is one of the national group having general offices at Dayton. Other units are located at Dayton, Buffalo and Marion. Immediate steps have been taken to recondition the plant, a crew of men having started work this week. E. C. Howell, of Dayton, is to take charge as general manager, with G. P. Pearce as assistant general manager and chief engineer. W. J. Runyon is vice-president and general superintendent.

Officials of the company announce that its products are purchased in large quantities by Timken Detroit Axle Co., Ford Motor Co., Hudson Motor Car Co., and other large automobile manufacturers.

Unaffected by Brass Rise

COLUMBUS, OHIO, March 2—"The rising prices for copper and brass are causing us no concern at the present time," it was stated yesterday by John B. Brown, president, John W. Brown Mfg. Co., maker of automobile lamps listed on the Chicago and Detroit stock exchanges. "We are large users of brass but our present requirements have been anticipated."

Orders 267 Buses

NEW YORK, March 4—Public Service Corp. of New Jersey, has ordered 267 buses from the Yellow Truck & Coach Mfg. Co. Most of the bodies will be built in the public service shops at Newark but all chassis will be produced in the General Motors shops at Pontiac, Mich.

Calendar of Coming Events

SHOWS

Geneva Automobile Show	Mar. 14-24
Leipzig, Germany, Fair	Mar. 3-13
Lyons, Fair	Mar. 4-18
Nice, Automobiles	Mar. 5-20
Vienna, Samples Fair	Mar. 10-17
Marseilles, Automobiles	Mar. 17-28
Nantes, Commercial	Apr. 4-15
Lille, Commercial	Apr. 6-21
Air-American Aircraft Show, Detroit	Apr. 6-14
Board of Commerce, Detroit	Apr. 6-14
Milan, Trucks	Apr. 12-27
Jugo-Slavia, Automobiles	Apr. 20-28
Budapest Auto Salon	May
Melbourne Automobile Show	May 2-11
International Aircraft Exhibition, Olympia, London	July 16-27
Paris, Automobiles	Oct. 3-13
London, Automobiles	Oct. 17-26
Prague, Automobiles	Oct. 23-30
Paris, Motorcycles	Oct. 23-Nov. 3

M.&E.A. Show, Chicago	Nov. 4-9
N.S.P.A. Show and Convention, Detroit	Nov. 11-16
Berlin Auto Salon	Nov. 14
London, Trucks	Nov. 7-16
Paris, Trucks	Nov. 14-24
London, Motorcycles	Nov. 30-Dec. 7
Brussels Auto Salon	Dec. 7

CONVENTIONS

Marketing Executives Conference, Hotel Gibson, Cincinnati	April 3-5
Annual Meeting National Foreign Trade Council, Baltimore	April 17-19
American Society of Mechanical Engineers, Detroit	May 1-3
American Management Association, New York	May 6-11
National Highway Traffic Association, Hotel Stevens, Chicago	May 13-15

RACES

Daytona, Fla.	Mar. 1-15
Akron	May 12
Gardner Trophy (Aircraft), St. Louis	May 28-30
Indianapolis	May 30
Detroit	June 9
Altoona, Pa.	June 15
Salem, N. H.	June 29
French Grand Prix	June 30
Akron	Aug. 18
Syracuse	Aug. 31
Altoona, Pa.	Sept. 2
Cleveland	Sept. 15
Salem, N. H.	Oct. 12

S. A. E.

Summer Meeting, Saranac Lake	June 25-28
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